NATIONAL REDD+ PROJECT IN THE DEMOCRATIC REPUBLIC OF CONGO

Kanaka Management Services Private Limited

Project Title	National REDD+ Project in the Democratic Republic of Congo
Version	1.0
Date of Issue	19-July-2021
Project Location	Democratic Republic of Congo, Tshopo, Sankuru, Equateur, Maniema, Bas-Uele and Tshuapa.
Project Proponent(s)	Kanaka Management Services Private Limited. No.271, 1stB Main, SFS 407, 4thPhase, Yelahanka New Town, Bengaluru-560064, India. Contact name: Mrs. Easwari Yesu Rani Email: info@kms-group.com Phone: +91-9535888854
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Validation Body	AENOR Internacional, S.A.U. Genova 6, 28004 Madrid, Spain Contact Name: José Luis Fuentes Pérez Email: jfuentes@aenor.com www.aenor.es
Project Lifetime	27 June 2017 – 26 June 2116; 100-year lifetime.
GHG Accounting Period	27 June 2017 – 26 June 2116; 100-year lifetime.
History of CCB Status	Initial validation and verification
Gold Level Criteria	Gold Level Criteria: Climate, Community, and Biodiversity. Climate Change Adaptation Benefits Exceptional Community Benefits Exceptional Biodiversity Benefits

	The KMS REDD+ Project aims to generate benefits in the areas of climate, community, and biodiversity under both the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB) standards. The Project will prevent the emission of an average of 155243885277 tCO2e (lifetime) by reducing deforestation and forest degradation and preserving biodiversity. The Project intends to enhance community well-being by creating awareness; distribution of improved cookstoves, providing good drinking water, enhanced food security, enhanced health-care facility, Enhancement of educational infrastructure, Monitoring and patrolling of forest areas, biodiversity & its habitat, and protecting Okapi, Bonobo and Chimpanzee.
Expected Verification Schedule	This joint validation and verification.

Table of Contents

The page numbers of the table of contents below shall be updated upon completion of the project description.

1 SUMMARY OF PROJECT BENEFITS

This section highlights some of this project's important benefits. Section 1.1 (Unique Project Benefits) should be aligned with a project's causal model and is specific to this project. Section 1.2 (Standardized Benefit Metrics) is the same quantifiable information for all CCB projects. This section does not replace the development of a project-specific causal model or the monitoring and reporting of all associated project-specific impacts (positive and negative) that are described in Sections 2-5 of this document.

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
The Project will provide support to enhance the community's organizational capabilities for better management of the local resources.	2.1.2
The Project will provide capacity building on the implementation of energy-efficient cook stoves to villages within and nearby the Project boundary.	2.1.2
The Project will manage land for conservation of biodiversity and local ecosystems through avoided unplanned deforestation and will enhance the ecosystem functionality by allowing deforested areas to regenerate thus eliminating ecosystem fragmentation.	2.1.2
The medium-term goal is to allow forest regeneration thus increasing the amount of carbon sequestered in the forest.	2.1.2
The Project will construct, rehabilitate, maintain, and support health centers and medical facilities in the Project area.	2.1.2
The Project will facilitate the improvisation of the schools and educational infrastructure facility.	2.1.2
The Project plans to have water bore wells in the identified and relevant villages for providing better drinking water.	2.1.2
The Project offers protection to local biodiversity, and the trigger species Okapi and its critical habitat.	2.1.2
The Project offers enhanced food security to the community.	2.1.2

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions	Net estimated emission reductions in the Project area, measured against the without-Project scenario	155243885277	2.1.2
	Net estimated emission removals in the Project area, measured against the without-Project scenario	NA	2.3.3
Forest[1] cover	For REDD[2] Projects: Estimated number of hectares of reduced forest loss in the Project area measured against the without-Project scenario	27840000	2.1.4
	For ARR[3] Projects: Estimated number of hectares of forest cover increased in the Project area measured against the without-Project scenario	N/A	N/A
Improved land management	Number of hectares of existing production forest land in which IFM[4] 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
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	Minimum of 48000 or above.	2.1.8
	Number of female community members who are expected to have improved skills and/or knowledge resulting from	Minimum of 24000 or above.	2.1.8

[1] 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*)
[2] 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*)
[3] 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*)
[4] 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 as part of Project activities		
Employment	Total number of people expected to be employed in Project activities,[5] expressed as number of full-time employees[6]	Minimum of 2003 or above.	2.1.8
	Number of women expected to be employed as a result of Project activities, expressed as number of full-time employees	Minimum of 1002 or above.	2.1.8
Livelihoods	Total number of people expected to have improved livelihoods[7] or income generated as a result of Project activities	Minimum of 431677 or above.	2.1.8
	Number of women expected to have improved livelihoods or income generated as a result of Project activities	Minimum of 215838 or above.	2.1.8
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	Minimum of 431677 or above.	2.1.8
	Number of women for whom health services are expected to improve as a result of Project activities, measured against the without-Project scenario	Minimum of 215838 or above.	2.1.8
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	Minimum of 215838 or above.	2.1.8
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of Project	Minimum of 48000 or above.	2.1.8

5 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.

6 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])

7 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
	activities, measured against the without-Project scenario		
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	Minimum of 431677 or above.	2.1.8
	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	Minimum of 215838 or above.	2.1.8
Well-being	Total number of community members whose well-being[8] is expected to improve as a result of Project activities	Minimum of 431677 or above.	2.1.8
	Number of women whose well-being is expected to improve as a result of Project activities	Minimum of 215838 or above.	2.1.8
	Expected change in the number of hectares managed significantly better by the Project for biodiversity conservation,[9] measured against the without-Project scenario	72010950 ha and Okapi distribution range covering 27523787 ha. In this Project, the target species is Okapi.	2.1.8

8 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.

9 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

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Biodiversity conservation	Expected number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of Project activities,[11] measured against the without-Project scenario	This Project offers protection to following threatened species. Mammals: 31 species Birds 36 species Reptiles 4 species Amphibians 13 species Fishes 84 species Mollusks 43 species Plants 95 species. In total 306 species. Including	5.1

10 Per IUCN's Red List of Threatened Species

11 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 project National REDD+ Project in the Democratic Republic of Congo (DRC) is a unique Avoided Unplanned Deforestation and Degradation (AUD). This initiative proceeds with promoting mitigation of climate change, biodiversity loss, habitat destruction and enhance the livelihood of the communities in the provinces of Tshopo, Sankuru, Tshuapa, Equateur, Bas-Uele and Maniema provinces under the VERRA scheme (VM0015) for Reducing Emissions from Deforestation and Degradation (REDD+). The project aims at conservation of 72010950 hectares of forest and several endemic & threatened species and their critical habitat viz., Okapi (Okapia johnstoni), Eastern lowland gorilla (Gorilla beringei graueri), Eastern chimpanzee (Pan troglodytes schweinfurthii) and Congo Peacock (Afropavo congensis). Endangered species and/or critically endangered species l'Hoest's Monkey (Allochrocebus lhoesti), Dryas monkey (Cercopithecus dryas) Grauer's gorilla (Gorilla beringei graueri) and the eastern chimpanzee (Pan troglodytes schweinfurthii).

Over the decades, humans played a vital role in shaping up landscapes by utilizing the ecosystem services for the sustenance of the societies. The Democratic Republic of Congo (hereafter, DRC), the second-largest tropical rainforest in the world located in Central Africa is inhabited by 70 million people approximately and 150 distinct ethnic groups many of whom are dependent shifting agriculture, hunting and firewood from forests. DRC includes 234 million hectares of land with 107 million in forest. The basin is defined by the watershed of the Congo. The Congo basin is home to mountain gorillas, lowland gorillas, chimps, forest Elephants, and over 1,000 species of birds such as pelicans, parrots, many species of sunbirds, pigeons, ducks, geese, eagles, vultures, cuckoos, owls, cranes, storks, and swallows. Insects are innumerable. There are hundreds of butterfly species; in the savanna woodlands, butterflies fill the skies at the beginning of the rains. There are also numerous varieties of bees, grasshoppers, caterpillars, praying mantises, beetles, dragonflies, scorpions, mosquitoes, tsetse flies, ants, termites, spiders, centipedes, and millipedes.

The land use and land cover change in DRC are both natural and anthropogenic. Over hundreds of years, locals depend on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana, and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow a fallow period of 5-20 years depending upon soil conditions, land availability, and other factors, and returned to clear and cultivate again. The palm oil generation is native to the African rainforests. About 2.6 million hectares of land across central and western Africa designated under palm cultivation hence, humid forests are under risk. The roads have increased tremendously is DRC as logging concession holders spend significant resources to build and maintain access roads. Traditionally, logging in past years used river transport but have increasingly turned to roads. Hydroelectric dams are a new and growing infrastructure investment with the potential to transform the forests and economy of the Congo Basin. Mining is an important activity in the forested region of the Congo basin. Gold, diamonds, cobalt, copper, and oil are major resources that are mined from the region. Most of the mining is small scale, artisanal, and/or unregulated. Recently, coltan and cassiterite, rare minerals used in mobile phones are mined from DRC. Fruit trees including African mango, butter fruit, Kola nut - the chief ingredient in Coca-Cola, mangosteen, Njangsa, tamarind, ber fruit, and African palm oil

have formed the significant source of the agroforestry project in DRC. In general, the Congo Basin contains relatively intact forests, although mining, unsustainable commercial logging, charcoal fuelwood harvesting, and bushmeat hunting are significant threats.

Tropical forest in DRC holds a vast reservoir for carbon in biomass which is important for climate change mitigation. VERRA has established a robust and transparent national forest monitoring system for reporting estimates of forest area, carbon stocks, and developing infrastructure to reduce emissions from deforestation and degradation for incentive. The objective of the project is to reduce deforestation in six provinces by the implementation of conservation activities which avoid deforestation.

This project's climate benefits include emissions (avoided) of approximately 142668581470 (one hundred forty-two billion six hundred sixty-eight million five hundred eighty-one thousand four hundred seventy) tCO2e over the lifetime of the Project which is a hundred years. This project also proceeds with substantial co-benefits with Climate, Community, and Biodiversity levels (CCB). The project also endeavors to achieve such benefits consistently at the CCB triple Gold level. The programs as a part of this initiative will improvise health, and livelihoods by creating awareness for the environment and biodiversity amongst the community. Biodiversity co-benefits will be achieved through greater protection of the habitat for endemic and critically endangered species through regular monitoring by patrolling.

This REDD+ Project is basically a community based REDD+ project with no evictions and no conflicts involved. Absolutely no displacement of human settlements and any other kind of disturbance due to this REDD+ project either in the project area or its surroundings.

2.1.2 Project Scale

Project Scale	
Project	
Large project	√

Table #1: Project Scale

2.1.3 Project Proponent (G1.1)

Organization name	Kanaka Management Services Private Limited.
Contact person	Mrs. Easwari Yesu Rani
Title	Director
Address	No.271, 1st B Main, SFS 407, 4th Phase, Yelahanka New Town, Bengaluru-560064, India.

Telephone	+919535888854
Email	info@kms-group.com

2.1.4 Other Entities Involved in the Project

Organization name	Not applicable
Contact person	Not applicable
Title	Not applicable
Address	Not applicable
Telephone	Not applicable
Email	Not applicable

2.1.5 Physical Parameters (G1.3)

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Over the decades, humans played a vital role in shaping up landscapes by utilizing the ecosystem services for the sustenance of the societies (Brandt et al., 2017). The Democratic Republic of Congo (hereafter, DRC), the second-largest tropical rainforest in the world located in Central Africa is inhabited by 70 million people approximately and 150 distinct ethnic groups many of whom are dependent shifting agriculture, hunting and firewood from forests. DRC includes 234 million hectares of land with 107 million in forest. The basin is defined by the watershed of the Congo. The Congo basin is home to mountain gorillas, lowland gorillas, chimps, forest Elephants, and over 1,000 species of birds such as pelicans, parrots, many species of sunbirds, pigeons, ducks, geese, eagles, vultures, cuckoos, owls, cranes, storks, and swallows. Insects are innumerable. There are hundreds of butterfly species; in the savanna woodlands, butterflies fill the skies at the beginning of the rains. There are also numerous

varieties of bees, grasshoppers, caterpillars, praying mantises, beetles, dragonflies, scorpions, mosquitoes, tsetse flies, ants, termites, spiders, centipedes, and millipedes.

The land use and land cover change in DRC are both natural and anthropogenic. Over hundreds of years, locals depend on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana, and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow a fallow period of 5-20 years depending upon soil conditions, land availability, and other factors, and returned to clear and cultivate again. The palm oil generation is native to the African rainforests. About 2.6 million hectares of land across central and western Africa designated under palm cultivation hence, humid forests are under risk. The roads have increased tremendously is DRC as logging concession holders spend significant resources to build and maintain access roads. Traditionally, logging in past years used river transport but have increasingly turned to roads. Hydroelectric dams are a new and growing infrastructure investment with the potential to transform the forests and economy of the Congo Basin. Recently, coltan and cassiterite, rare minerals used in mobile phones are mined from DRC. Fruit trees including African mango, butter fruit, Kola nut – the chief ingredient in Coca-Cola, mangosteen, Njangsa, tamarind, ber fruit, and African palm oil have formed the significant source of the agroforestry project in DRC. In general, the Congo Basin contains relatively intact forests, although mining, unsustainable commercial logging, charcoal fuelwood harvesting, and bushmeat hunting are significant threats.

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The following are the geodetic coordinates of the Project area.

A.Tshuapa

Extent Boundary	Location (Longitude and Latitude)
Upper left	19.210, 1.844
Lower left	19.158, -2.617
Upper right	24.552, 1.821
Lower right	24.572, -2.611

B. Tshopo

Extent Boundary	Location (Longitude and Latitude)
Upper left	22.127, 2.488
Lower left	22.207, -2.225
Upper right	28.280, 2.452
Lower right	28.266, -2.235

C. Sankuru

Extent Boundary	Location (Longitude and Latitude)
Upper left	21.480, -1.723
Lower left	21.489, -5.969
Upper right	25.646, -1.717
Lower right	25.500, -5.975

D. Equateur

Extent Boundary	Location (Longitude and Latitude)
Upper left	16.162, 2.214
Lower left	16.236, -2.085
Upper right	21.139, 2.193
Lower right	21.151, -2.076

E. Bas-Uele

Extent Boundary	Location (Longitude and Latitude)
Upper left	27.065, 4.420
Lower left	22.385, 1.904
Upper right	27.788, 5.558
Lower right	27.824, 1.775

F. Maniema

Extent Boundary	Location (Longitude and Latitude)
Upper left	23.843, 0.025
Lower left	24.007, -5.107
Upper right	28.765, 0.025
Lower right	28.925, -5.103

Table #1: Geodectic coordinates of the provinces of REDD+ Project Area.

The combined geodetic coordinate of the KMS REDD+ project area (All six provices) is

Extent Boundary	Location (Longitude and Latitude)
Upper left	16.206, 5.005
Lower left	16.179, -6.6063
Upper right	28.28, 5.014
Lower right	28.252, -6.027

Table #1a: Geodectic coordinates of the REDD+ Project Area.

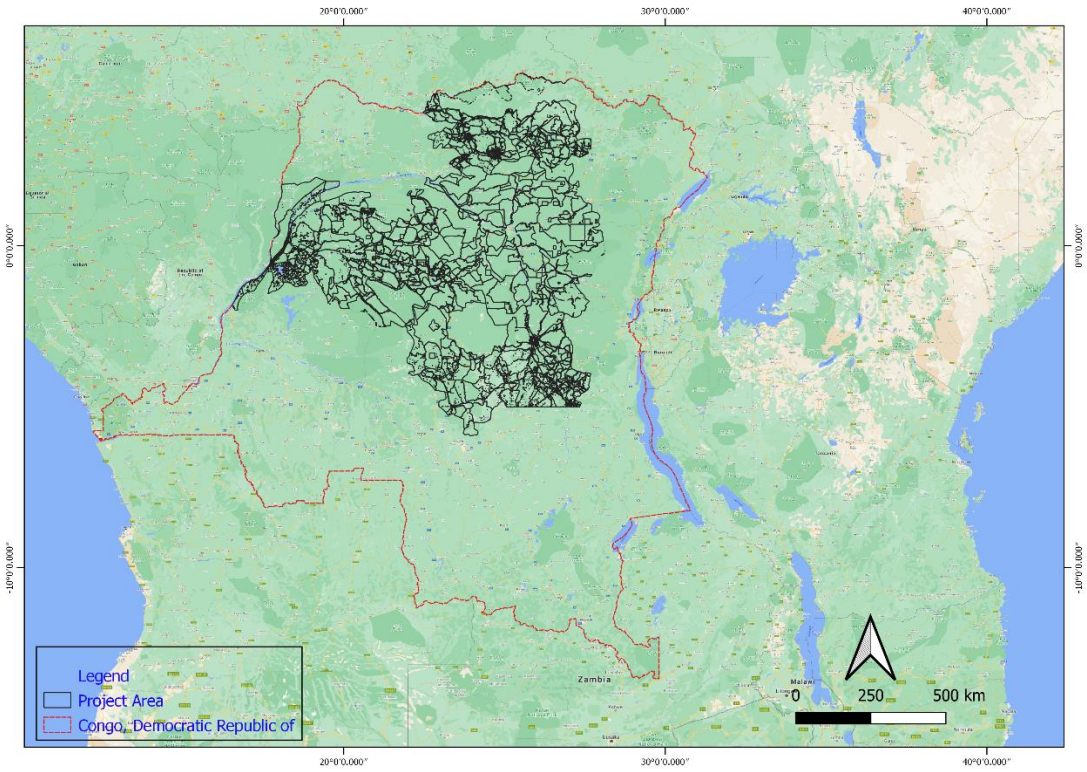

Figure #1 – Location map of the "National REDD+ Project in the Democratic Republic of Congo".

Topography

The National REDD+ Project area is a major topographical feature include a large Congo river basin a major valley high plateaus three mountain ranges and a low coastal plain. The majority of the REDD+ project area is composed of the central Congo basin a plain with an average elevation of about 520 meters above sea level. The lowest point of 338 meters occurs at Lake Mai-Ndombe and the highest point of 700 meters is reached in the hills of Mobayi-Mbongo and Zongo in the north. The basin may once have been an inland sea whose only vestiges are Lakes Tumba and Mai-Ndombe in the west-central region.

The north-south Western Rift Valley the western arm of the East African Rift System forms the country's eastern border and includes Lakes Albert Edward Kivu Tanganyika and Mweru. This part of the country is the highest and most rugged with striking chains of mountains. The Mitumba Mountains stretch along the Western Rift Valley rising to an elevation of 2990 meters. The snow-covered peaks of the Ruwenzori Range between Lakes Albert and Edward lie astride the Ugandan border and mark the country's highest elevation of 16763 feet (5109 meters) at Margherita Peak. The volcanic Virunga Mountains stretch across the Western Rift Valley north of Lake Kivu.

High plateaus border almost every other side of the central basin. In the north, the Ubangi-Uele plateaus form the divide between the Nile and Congo river basins. Rising to between 3000 and

4000 feet (915 and 1220 meters) these plateaus also separate the central basin from the vast plains of the Lake Chad system. In the south, the plateaus begin at the lower terraces of the Lulua and Lunda river valleys and rise gradually toward the east. In the southeast the ridges of the plateaus of Katanga (Shaba) province tower over the region; they include Kundelungu at 5250 feet (1600 meters) Mitumba at 4920 feet (1500 meters) and Hakansson at 3610 feet (1100 meters). The Katanga plateaus reach as far north as the Lukuga River and contain the Manika Plateau the Kibara and the Bia mountains and the high plains of Marangu.

The northern cliff of the Angola Plateau rises in the southwest while in the far west a coastal plateau zone includes the hill country of Mayumbe and the Cristal Mountains. A narrow coastal plain lies between the Cristal Mountains and the Atlantic Ocean.

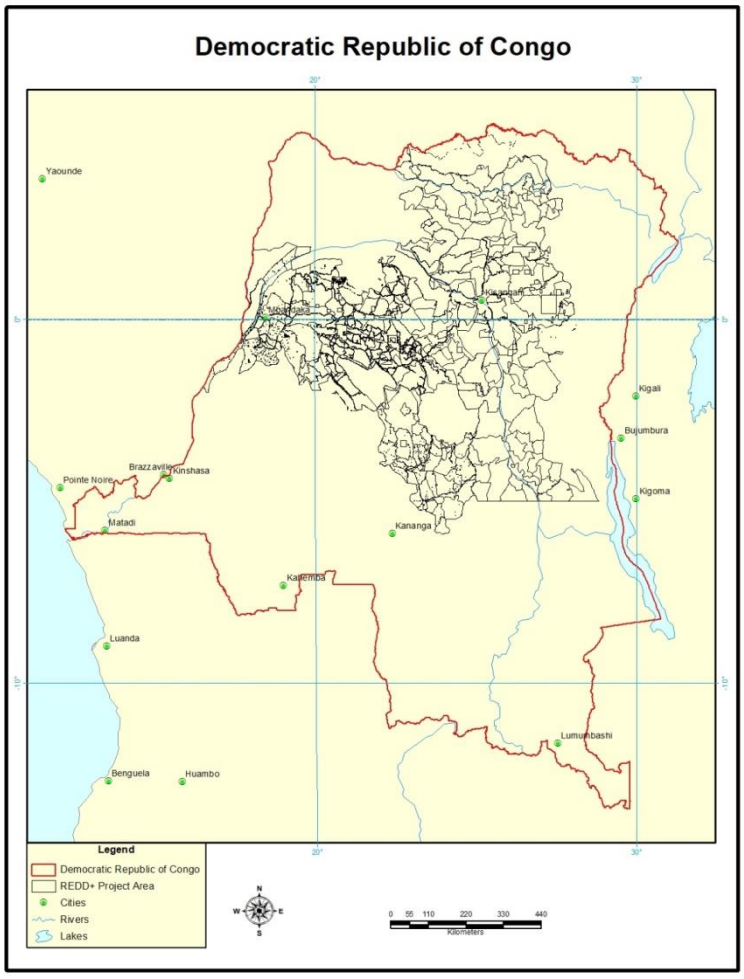

Figure #2 – Topography map of "National REDD+ project in the Democratic Republic of Congo".

Soil

Soils are of two types: equatorial areas and drier savanna (grassland) regions. Equatorial soils occur in the warm humid lowlands of the central basin which receive abundant precipitation

throughout the year and are covered mainly with thick forests. This soil is almost fixed in place because of the lack of erosion in the forests. In swampy areas the very thick soil is constantly nourished by humus the organic material resulting from the decomposition of plant or animal matter. Savanna soils are threatened by erosion but the river valleys contain rich and fertile alluvial soils. The highlands of the Great Lakes region in eastern Congo are partly covered with rich soil derived from volcanic lava.

Climate

The National REDD+ project area is located in the Tropical rainforest (Af) according to the Köppen–Geiger climate classification system. This region is typically hot, very humid, and wet.The tropical rainforest climates are more dominated by the Intertropical Convergence Zone (ITCZ) than the trade winds with no or rare cyclones, so usually located near the equator, they are also called equatorial climates. These regions are more dominated by the trade winds than the ITCZ, they are called tropical trade-wind climates. The atmospheric pressure is low, almost constant so the (horizontal) pressure gradient is low. Consequently the winds are rare and usually weak (except sea and land breezes in coastal areas). The wind is almost permanent which incidentally explains why rainforest formations are impoverished compared to those of equatorial climates due to their necessary resistance to strong winds accompanying tropical disturbances. Tropical rain forests have a type of tropical climate in which there is no dry season—all months have an average precipitation value of at least 60 mm. In rainforest climates the dry season is very short and rainfall is normally heavy throughout the year. On a given day in a tropical rainforest climate can be very similar to the next while the change in temperature between day and night may be larger than the average change in temperature during the year. The Precipitation/Rainfall in project area is abundant ranging from 1700 to 2000 mm per year occurring usually between April – May and June – July. Temperatures are relatively stable with slight variations between day and night. The annual temperatures range from 20 degree Celsius – to 27 degree Celsius with humidity about 80 percent. The seasons too vary towards the north of equator the wet season occurs between April to October & dry season December to February. In south of Equator, wet season is found from November to March and dry season April to October. The Precipitation/Rainfall in REDD+ project area is abundant ranging from 1700 to 2000 mm per year occurring usually between April – May and June – July. Temperatures are relatively stable with slight variations between day and night. The annual temperatures range from 20 degree Celsius – to 27 degree Celsius with humidity about 80 percent. The seasons too vary towards the north of equator the wet season occurs between April to October & dry season December to February (Figure #3 and #3a).

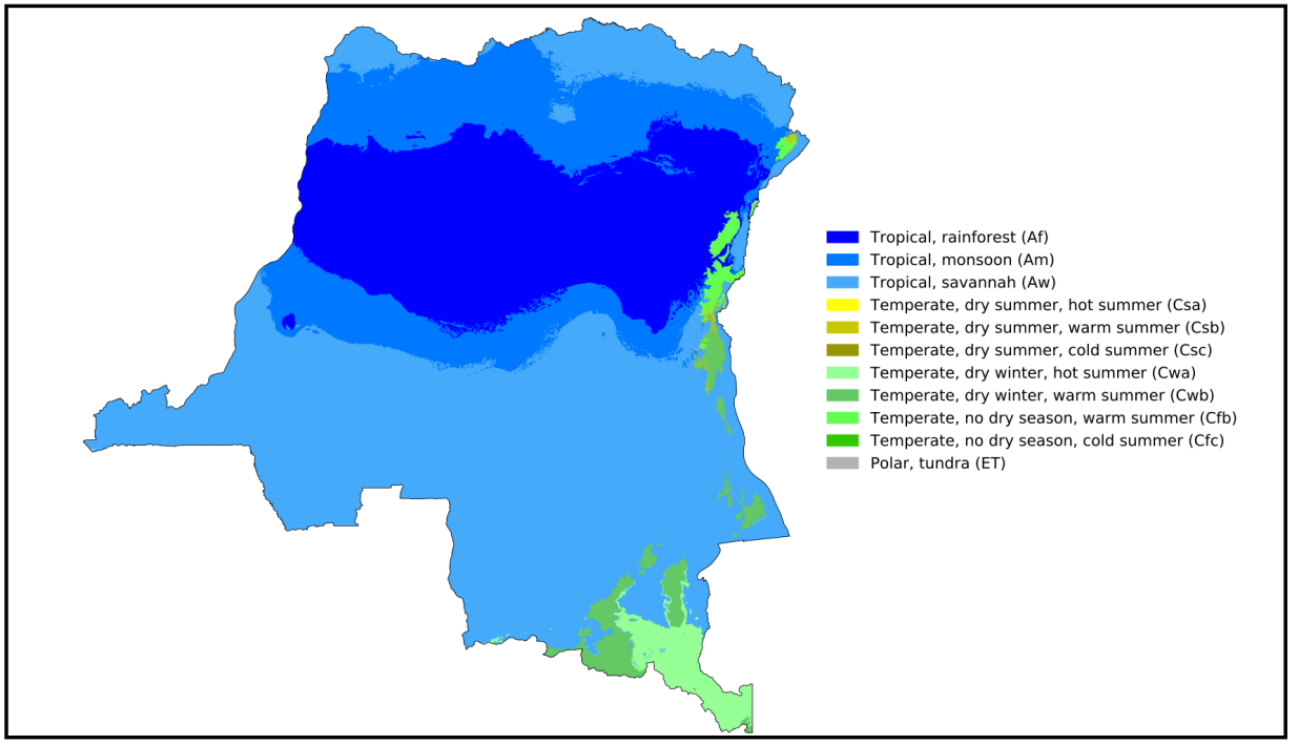

Figure #3 – Köppen-Geiger climate classification source Beck et al. 2018

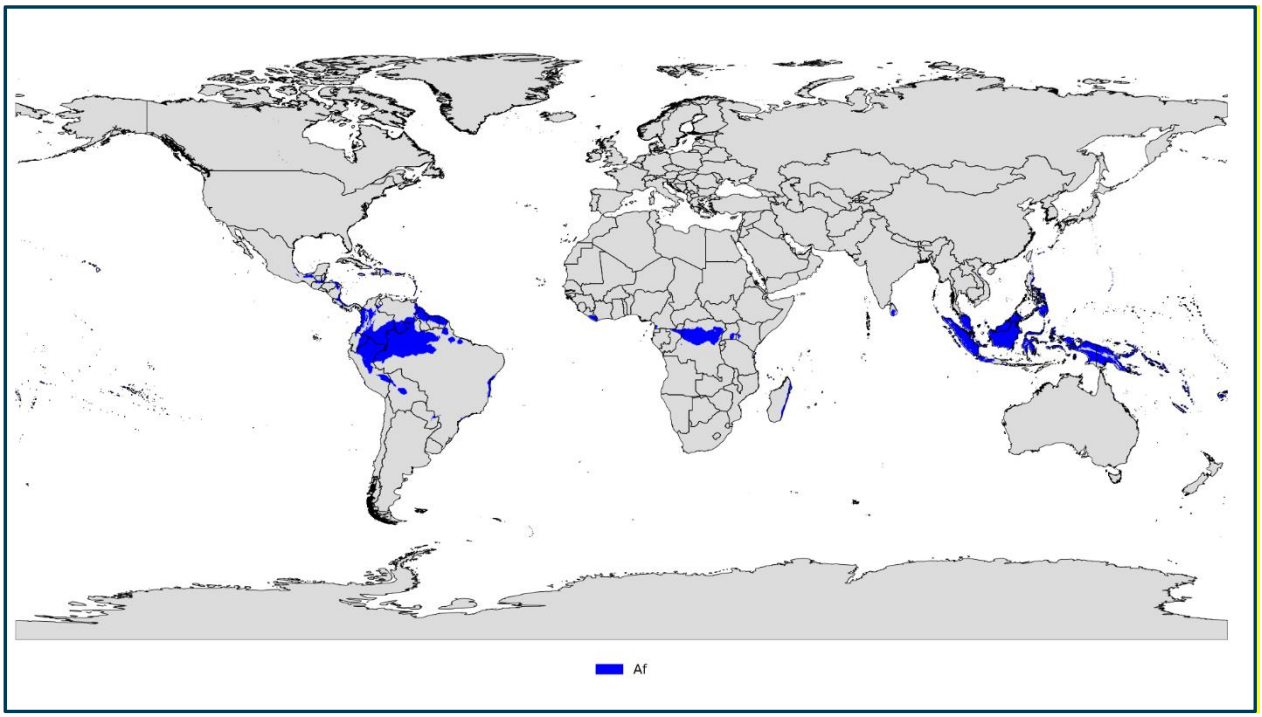

Figure #3a – Source Beck et al. Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018).

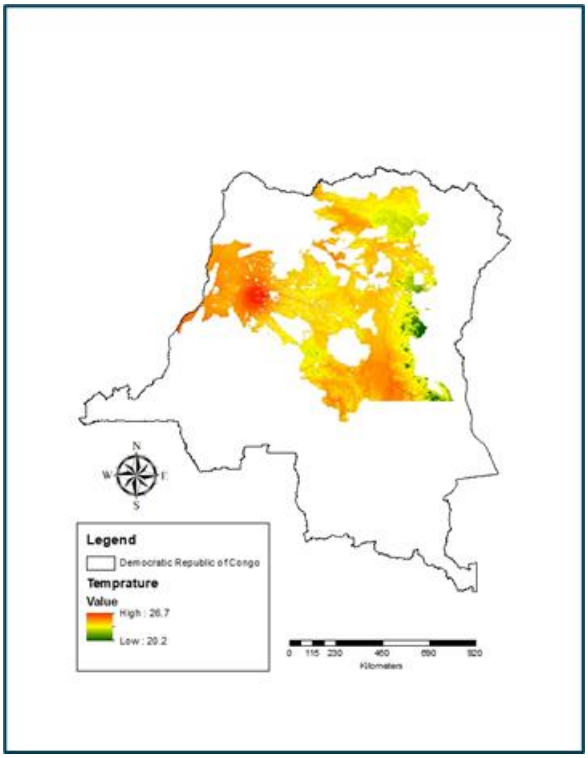

Figure #4 – Temperature map of "National REDD+ project in the Democratic Republic of Congo" source Beck et al. 2018

Hydrology

The Congo River formerly Zaire River is the chief drainage system in REDD+. The Congo has a regular flow, which is fed by rains throughout the year. It raises in the Katanga plateaus and flows north and south in a great arc crossing the equator line. The river flow's southwest to join the Atlantic Ocean near Matadi and Banana. It is the second-longest and deepest river in the world. In Sankuru province the chief rivers are Sankuru Lomami Lubefu and Lukenie. The chief rivers of Tshopo are the Congo river Lomami and Yambuya The Tshuapa river is the chief hydro source of Tshuapa and in Equateur, the major river is Congo and Lulonga (World Bank 2017).

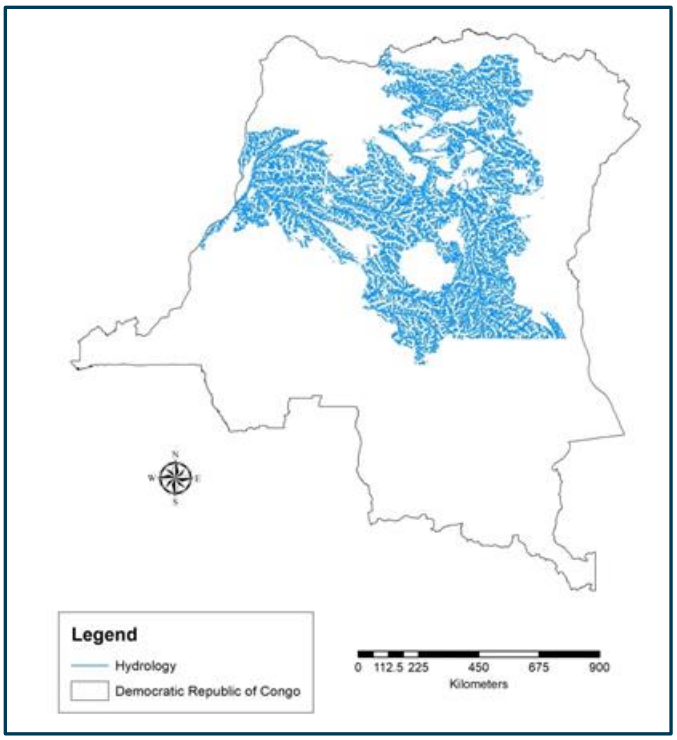

Figure #5 – Hydrology map of "National REDD+ project in the Democratic Republic of Congo"

Vegetation

The KMS REDD+ Project has the following chief vegetation types viz. Tropical and subtropical grassland savanna shrub-land tropical and subtropical moist broadleaf forest. The Grasslands and woodlands are characteristic of the tropical climate zone. The eastern plateaus are covered by grasslands, and mountain forest, bamboo thickets, and Afro-Alpine vegetation occur on the highest mountain. There are several studies which reveals that the majority of Congo deforestation occured between 2000 and 2014 happened in primary forests and woodlands, and in mature secondary forests. The trees here exhibit shallow and/or buttressed roots, for maximum nutrient absorption and stability in wet soils. The Bark on tropical trees is usually smooth and thin, instead of the thick textured bark of dry or temperate forests. The smooth bark prevents epiphytes and lianas from growing on the tree surface, as well as reducing the risk of fungal infection and the Leaves are often waxy with drip tips to shed excess water and prevent nutrient loss. The Plants here has developed chemical defense mechanish to protect themselves from insects and other herbivores. The ant mutualisms are especially common in the Acacia trees. Towards the interior of the forests in the Project Area, especially in the understory cover there is a severe shortage of wind available to pollinate flowers and disperse seeds. Therefore many plants have developed elaborate relationships with insects and other animals. The flowers exhibit varity of colors, aromas, and nectar rewards to attract pollinators such as bees, butterflies, and moths. Filling this ecological niche in Africa are nectar feeding sunbirds. Trees like the coral tree (Erythrina spp.) have evolved horizontal facing flowers for perching for the sunbirds to pollinate them. The plants have also evolved to create edible fruits and seed covers to facilitate dispersal by the rainforest animals. In the Congo Basin, the Moabi

tree (Baillonella toxisperma), an important resource for timber and medicine, is large seeded and dispersed only by large mammals such as Elephants and Gorillas. The Cola lizae, a member of the Kola nut group (and an original ingredient in Coca-cola) is a dominant tree and observed to be dispersed largely by Gorillas. The recent studies shows that rodent dispersal are common in trees such as Carapa grandiflora. Interestingly, these characteristics, as well as the frequent mild disturbance of events such as treefalls are thought to be one of the major factors leading to the great biodiversity of tropical rainforests. The United Nations projects that there will be a fivefold increase in human population in the Congo Basin by the end of the century. The major forest species of plants include bromeliads (bromeliaceae), Venus fly traps, ferns, orchids, buttress roots, and Kapok trees which might impact on the natural resources. The wildlife of the project area includes its flora comprising a large biodiversity in rainforests, seasonally flooded forests and grasslands. The entire country is considered one of the 17 megadiverse nations. The civil war and resultant poor economic conditions have endangered much of this biodiversity. Many park wardens were either killed or could not afford to continue their work. The vegetation types are reclassified to dense forest and sparse forest in this project (Figure #6).

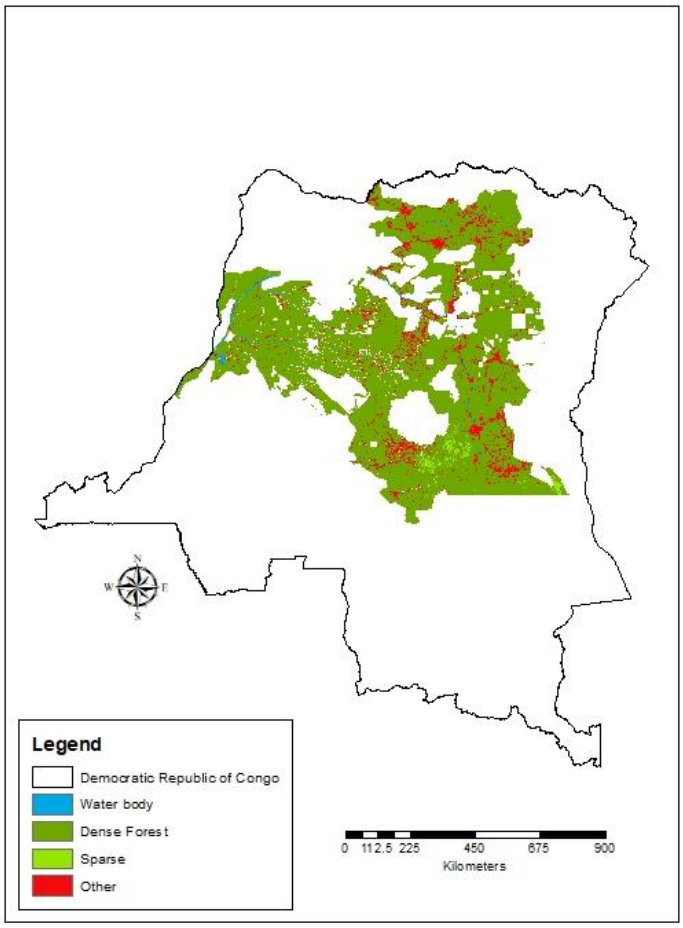

Figure #6 – Vegetation map of "National REDD+ Project in the Democratic Republic of Congo"

Ecosystem

The KMS REDD+ Project falls under the tropical rainforest (Sosef 1996). The Equateur falls under Western Congolian swamp forests and Eastern Congolian swamp forests. The Tshopo falls under North-Eastern Congolian forests Eastern Congolian swamp forests and Western Congolian swamp forests. Sankuru falls under Southern Congolian forest-savanna mosaic and Tshuapa falls under Central Congolian lowland forests (WWF 2001).

The National REDD+ Project of the Democratic Republic of Congo is broadly classified under the tropical rainforest (Sosef, 1996). However due variation is spatial dynamics the REDD+ project area is classified as following ecosystem: Western Congolian swamp forests (Equateur) Northern Congolian forest-savanna mosaic (Bas-Uele) North-eastern Congolian lowland forests (Tshopo & Bas-Uele) Southern Congolian forest-savanna mosaic (Bas-Uele) Eastern Congolian

swamp forests (Equateur) Central Congolian lowland forests (Equateur) Albertine Rift montane forests (Tshuapa) and Central Zambezian Miombo woodlands (Maniema) by World Wide Fund in 2001.

The Western Congolian swamp forests (Equateur): This ecoregion along with the neighboring Eastern Congolian Swamp Forest ecoregion are globally outstanding because they contain some of the largest areas of true swamp forest on the planet. Although these forests are not exceptionally rich in species numbers they support intact populations of several large mammals such as lowland gorillas chimpanzees golden-bellied mangabey's and Allen's swamp monkeys.

The Northern Congolian forest-savanna mosaic (Bas-Uele) is a ecoregion of central Africa. The part of the belt of transitional forest-savanna mosaic that lie between Africa's equatorial forests and the tropical dry forests savannas and grasslands that lie to the north and south. The Northern Congolian forest-savanna mosaic lies between the equatorial Congolian forests to the south and the drier East Sudanian savanna to the north. This ecoregion extends from the Cameroon Highlands in the west across central Cameroon and the southern Central African Republic to southwestern South Sudan and north-eastern Democratic Republic of the Congo.

The North-eastern Congolian lowland forests (Tshopo & Bas-Uele) is dominated by okapi, giant genet aquatic genet mountain shrew African foggy shrew Congo shrew fuscous shrew (C. polia) owl-faced monkey L'Hoest's monkey pied bat Allen's striped bat Misonne's soft-furred mouse Verschuren's swamp rat eastern lowland gorilla Neumann's coucal golden-naped weaver Nahan's francolin Ituri batis Turner's eremomela Congo peacock Sassi's greenbul Bedford's paradise-flycatcher Chapin's mountain-babbler Zaire dwarf gecko Kigulube reed frog (Hyperolius diaphanus) Kunungu reed frog (H. schoutendeni) Mertens' running frog (Kassina mertensi) Buta River frog (Phrynobatrachus gastoni) Christy's grassland frog (Ptychadena christyi) and Pangi Territory frog (Rana amieti). This region in particularly located in the north-eastern Congo lowland forests. This ecoregion is home to more gorillas and chimpanzees than any other region in the world. The forest is about the size of Nevada and Oregon combined. Humans are impacting this region by mining and logging. In this biome there are many plants that are endemic (which means they only live in this area and nowhere else). There are more than 600 species of vascular plants in this biome. One of the producers is the Congo cockatoo. This plant is flowers all year around and is adapted in many ways to this habitat. One of the herbivores here in my region in Congo lowland forest is the Okapi. This animal is closely related to the giraffe.

The Southern Congolian forest-savanna mosaic (Bas-Uele) covers a large area of the southern Democratic Republic of the Congo. Many African elephants are found in this forest including a number of different species. It's rich blend of habitats provides key insights into the biogeography of central Africa with the extensive climatic variation that it has been experiencing

for the last 10 million years. The human population is not high. There is only one secured area in this ecoregion.

The Eastern Congolian swamp forests (Equateur) are a fairly intact but under researched ecoregion of the tropical and subtropical moist broadleaf forests biome. It is located within the Central African Republic and Democratic Republic of the Congo. This is the eastern half of one of the largest areas of swamps in the world. The forest is a mixture of habitats including wetlands and swamps with drier forest and savanna slightly higher and flooded seasonally by the Congo and its tributaries. The region has been insufficiently researched by zoologists but is known to be home to forest elephants (Loxodonta africana cyclotis) (which may have been reduced by poaching especially near the larger rivers) and several primates including the rare bonobo (Pan paniscus). The Congo is a natural barrier to movement of wildlife and many species only occur on this eastern side of the river including many primates: the bonobo and also Angolan colobus (Colobus angolensis) Wolf's mona monkey (Cercopithecus wolfi) golden-bellied mangabey (Cercocebus galeritus chrysogaster) black mangabey (Lophocebus atterimus aterrimus) southern talapoin (Miopithecus talapoin) and the Dryas monkey (Cercopithecus dryas). Near-endemic mammals include Hutterer's brush-furred mouse (Lophuromys huttereri) Allen's striped bat (Chalinolobus alboguttatus) and Muton's soft-furred mouse (Praomys mutoni). These rainforests are rich in birdlife including the Congo sunbird (Cinnyris congensis) African river martin (Pseudochelidon eurystomina) and Congo martin (Riparia congica). Endemic amphibians and reptiles include a small frog (Cryptothylax minutus) Chapin's chameleon (Trioceros chapini) a wall lizard (Gastropholis tropidopholis) the Zaire snake-eater (Polemon robustus) and a worm lizard (Zygaspis dolichomenta).

The Central Congolian lowland forests (Equateur) are an ecoregion within the Democratic Republic of the Congo. This is a remote inaccessible area of low-lying dense wet forest undergrowth and swamp in the Cuvette Centrale region of the Congo Basin south of the arc of the River Congo. The region has been insufficiently researched by zoologists but is known to be home to antelopes forest elephants and several primates including the rare bonobo (Pan paniscus) De Brazza's monkey crested mangabey and the lowland gorilla. There is only one known strictly endemic mammal the Dryas monkey (Cercopithecus dryas). Other near-endemic mammals include the golden-bellied mangabey (Cercocebus chrysogaster) bonobo (Pan paniscus EN) Okapi (Okapia johnstoni) Allen's swamp monkey (Allenopithecus nigroviridis) Angolan kusimanse (Crossarchus ansorgei) Thollon's red colobus (Procolobus tholloni) and Wolf's mona monkey (Cercopithecus wolfi). There are two birds that are near-endemic in the region the Congo peafowl (Afropavo congensis VU) and the yellow-legged weaver (Malimbus flavipes). The forest remains largely unspoilt as human population is limited to small communities who hunt and fish along the many rivers that cross this remote swampy region. However many animals are vulnerable to poaching and their movements are restricted by the network of waterways. The Salonga National Park is a huge protected area within the region one of the largest national parks in the world and the second largest tropical forest national park in the world. The Cuvette Centrale is remote and sparsely populated there are some riverside

markets and villages such as Ikela but access to this area is difficult (by dugout canoe) and/or expensive (there are airstrips near Salonga Park). Albertine Rift montane forests (Thuapa) high montane forests cover the western portions of Rwanda and Burundi the eastern edge of the Democratic Republic of the Congo and portions of western Uganda and Tanzania. This area occupies the parallel Albertine Rift Mountains that enclose the western branch of the East African Rift. The mountain ranges include the Lendu Plateau of Uganda (the forest is almost completely cleared from here) and the Virunga Mountains and Rwenzori Mountains of Rwanda Uganda and the Democratic Republic of the Congo. The mountain rainforests of the ecoregion have a cooler climate than the Congolian lowland forests or the savanna of Uganda Rwanda and Burundi and therefore are home to a rich variety of Afromontane flora and especially fauna.

The Albertine Rift montane forests are included on the Global 200 conservation list. The rare mountain gorilla (Gorilla beringei beringei) survives only in this ecoregion as do the L'Hoest's monkey and a subspecies of the Hamlyn's monkey − as well as many endemic species of butterflies and birds including: Grauer's warblers Chapin's flycatchers and the Rwenzori turaco. The Lendu Plateau clawed frog is endemic to that landform in the ecoregion. Majority of the forest has already been cleared for agriculture or for logging especially in densely populated Rwanda and Burundi but large areas of forest still remains in forest reserves and at higher altitudes in the Virunga Itombwe and Rwenzori Ranges. The forest clearance is ongoing and is a major threat to the ecology of the region. The violent political and rebel history of the region in recent times has also caused damage to the ecological balance for example almost eliminating the population of African bush elephants from Virunga National Park in the DRC. The Central Zambezian Miombo woodlands (Maniema) are densely forested Central Zambezian Miombo woodlands that cut across southern central Africa are one of the largest ecozones on the continent and home to a great variety of wildlife including many large mammals. The area is mostly flat plateau and the soils are poor. There is a tropical climate with a long dry season up to seven months which leaves the forest vulnerable to fires and a rainy season from November to March. The woodland is interspersed with riverside dambos (grassy wetlands) which may constitute up to thirty percent of the region. The woodlands contain much typical Miombo flora of high trees with shrub and grassland underneath but has much other plant life too. There are typically more evergreen trees than in most Miombo woodlands. The classic Miombo trees Brachystegia Julbernardia and Isoberlinia dominate the woodlands with other tree species such as Pterocapus angolensis Albizia sp. and Afzelia quanzensis. Under the trees lie important areas of plants such as the herbaceous Crotalaria and Indigofera. The fauna is diverse. The grasses shrubs and trees sustain many large mammals including black rhino Cape buffalo African elephants and antelopes such as elands sable antelope roan antelope Lichtenstein's hartebeest and sitatunga. Large carnivores include lion (Panthera leo) leopard (Panthera pardus) cheetah (Acinonyx jubatus) spotted hyena (Crocuta crocuta) striped hyena (Hyaena hyaena) African wild dog (Lycaon pictus) and side-striped jackal (Canis adustus). There are also many primates in the woodlands particularly in Uganda and the Democratic Republic of the Congo including yellow baboon and chimpanzee. The Gombe Stream National Park chimpanzee reserve is in this ecoregion. The only endemic mammals are Monard's dormouse

(Graphiurus monardi) Rosevear's lemniscomys (Lemniscomys roseveari) Ansell's shrew (Crocidura ansellorum) and Upemba shrew (Crocidura zimmeri). Although the ecoregion does include large areas of wilderness and national parkland there are also areas with quite heavy population densities particularly in Malawi and Burundi and in densely populated urban areas such as Lusaka in Zambia around which the forest has been largely cleared for planting firewood and charcoal production. Most of Zambia north of Lusaka is in this ecoregion including the Copperbelt cities of Ndola Kitwe Chingola location of the huge Nchanga Mines Luanshya and the Central Province former mining town of Kabwe (Broken Hill).

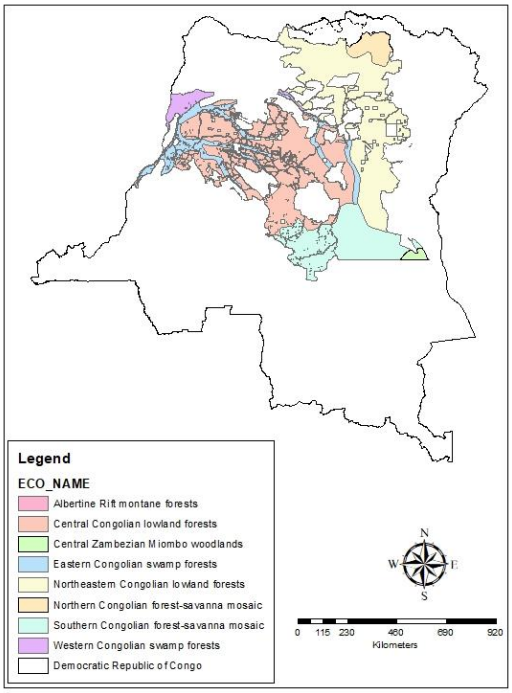

Figure #7 – The Ecosystem map of "National REDD+ project in the Democratic Republic of Congo". Source World Wide Fund 2001

Soil

The KMS REDD+ Project the soils of the Congo Basin forests are generally nutrient poor, weathered, and acidic. Few studies suggest that humid forests of the interior are most lacking in soil phosphorous, whereas the forest savannah ecosystems are more lacking in nitrogen, thus giving rise to the numerous nitrogen fixing trees such as *Acacia*. The nutrient poor soils in the Congo Basin are generally unproductive for permanent agriculture therefore slash and burn agriculture is very common where the farmers grow for few years and abandon it for 5-20 yeas hence, the native peoples instead practice shifting cultivation in order to manage soil fertility.

2.1.6 Social Parameters (G1.3)

The Democratic Republic of Congo (hereafter, DRC), the second largest tropical rainforest in the world located in the Central Africa is inhabited by 84 million people (United Nations 2018) approximately. The population here belongs to over 200 ethnic groups of which majority are Bantu peoples whereas the Pygmies are the minority constituting around 1% of the total population found in Maniema and Equator. There are about 10 large highly populated cities or towns (Table 1) and numerous villages ranging from 4-150 households settling along the roads on the forest fringes and also few in remote areas. Around 92% people realize that agriculture, charcoal production, illegal logging, bush meat sales as the main opportunity for increasing the standard of life, therefore the majority of people are involved in these activities in some way. Historically, native populations of DRC have practiced shifting cultivation in forest areas for thousands of years and depended on native biodiversity as protein supplement. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow fallow period of 5-20 years depending upon soil conditions, land availability and other factors, and returned to clear and cultivate again. A family will have at least 5-7 such lands in any point of time. The cultivation includes cassava, yams, cocoyam, banana and occasionally ground nuts. The palm oil generation is native to the African rainforests. Cultivation of Fruit trees including African mango, butter fruit, Kola nut - the chief ingredient in Coca-Cola, mangosteen, Njangsa, tamarind, ber fruit and African palm oil have formed significant source of the agro-forestry Project in DRC. DRC continues to be a destination country for immigrants, in spite of recent declines in their numbers. Immigration is very diverse in nature; refugees and asylum-seekers. There are no accurate statistics and extremely difficult to obtain reliable migration data. Additionally, the countries large and small mine operations attract migrant workers from Africa and beyond. There is also considerable migration for commercial activities from other African countries and the rest of the world, but these movements are not well studied. The population in the DRC, which is blessed with vast land and abundant natural resources, 75% still live under the poverty line, and the economic inequality among the population is widening. As indicated by the Gender Inequality Index and SIGI, gender relations in the DRC are determined by strong male-dominant gender norms. The Women's labour participation is high (70.7%), and almost the same as that of men (73.2%); however, women are in a more difficult situation than men. Women's unemployment rate is low when compared with men. Women's labour is concentrated in agriculture and the informal sector and gender norms limit their access to productive assets such as land and capital. The issue of gender-based violence against women in the DRC, and especially sexual violence in conflicts is widely known. Marriage is also prescribed by unequal gender relations and women's rights are often not protected; after the death of the husband, the husband's family may take away the couple's assets from the widow. Early marriage of girls is prevalent. Early marriage results in the low education levels of women resulting from dropping out of school, imbalanced power relations at home, and reproductive health problems. Violence against women is also a health issue, causing serious health problems to victims such as HIV infection. The Unemployment rate is a major issue and the government has been trying to address it by establishing policies, plans, and councils where youth can express their opinions. However, several ministries are involved in vocational training without having set up a unified vocational training system. Many vocational training institutions issue own certificates without harmonizing training contents. The women participation in such trainings are very low. The children's in DRC is often devoid of education due to lack of infrastructure and low quality education in several areas of the DRC. Lack of developed roads, transportation facilities and less house hold income after restrict children is getting education. In general, the education is restricted to people who can afford huge fees. Health problems have been a long-standing issue limiting development in the Democratic Republic of the Congo (DR Congo). Medical facilities are severely limited, medical materials are in short supply. An adequate supply of prescription or over-the-counter drugs in local stores or pharmacies is also generally not available. Malaria is a major health problem in the DR Congo. Malaria is the

principal cause of morbidity and mortality, accounting for more than 40 percent of all outpatient visits and for 19 percent of deaths among children fewer than five years of age. Given that the majority of the population lives in high transmission zones. HIV/Aids are the most serious health problem in the DR Congo due to the incurable nature of the disease. In near future, UNAID estimates that several million people will be living with HIV/AIDS, for an overall adult HIV prevalence of 4.2%. Life expectancy in the DR Congo dropped significantly as a result of HIV/AIDS. Cholera has very high incidence and mortality rate in DRC due to lack of resources and inadequate surveillance system. Ebola incidence is also very high in DRC and has taken toll on several thousands of people in DRC. Therefore, the disease outbreaks are a potential hazard for the people living in and around the project areas. Hence, KMS interventions in promoting healthcare facilitites and material support to the communities and improve their health conditions.

Rank	Name	Province
1	Kinshasa	Kinshasa
2	Lubumbashi	Katanga
3	Mbuji-Mayi	Kasai-Oriental
4	Kananga	Kasaï-Central
5	Kisangani	Orientale
6	Goma	North Kivu
7	Bukavu	South Kivu
8	Tshikapa	Kasai Province
9	Masina	Kinshasa
10	Kolwezi	Katanga

Table #1 – The main cities/towns of the Democratic Republic of Congo".

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

The KMS REDD+ Project area comprised of dense humid forest and sparse forest. These forests hold vast reservoir of Carbon if not protected then would have severe impact on the climate. These forests are home for several endemic, threatened and ecologically important species.

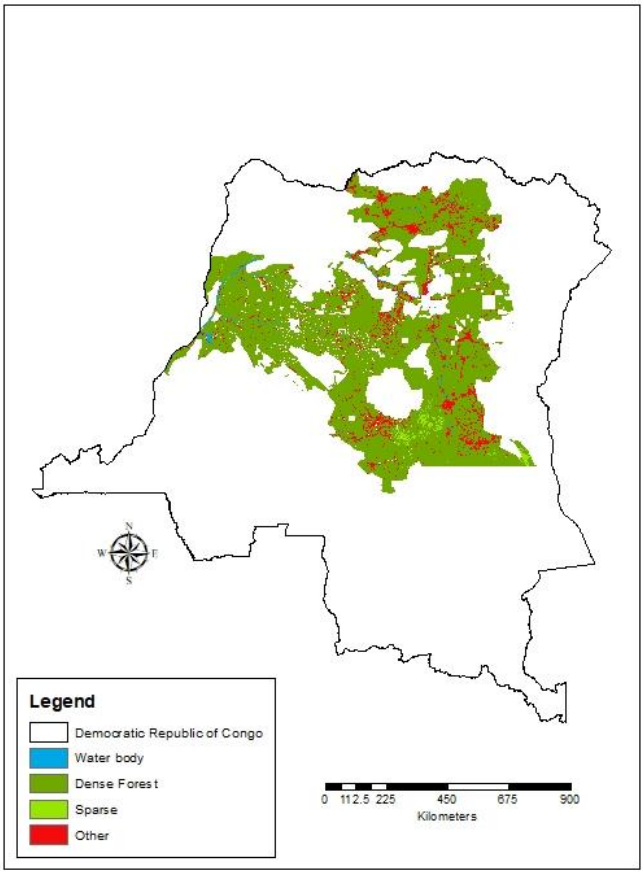

Figure #8 – The Land Cover map of "National REDD+ project in the Democratic Republic of Congo". Source World Wide Fund 2001

HCV1. In Project area, the forest area support several regionally, nationally and internationally significant, concentration of biodiversity this includes several flora and fauna which coexists with human for several hundreds of years. Some of the highly valueable species that exits are Eastern low-land gorilla (Gorilla beringei graueri), Eastern chimpanzee (Pan troglodytes schweinfurthii) and Congo Peacock (Afropavo congensis). l'Hoest's Monkey (Allochrocebus lhoesti), Dryas monkey (Cercopithecus dryas) Grauer's gorilla (Gorilla beringei graueri) and the eastern chimpanzee (Pan troglodytes schweinfurthii).

HCV2. The Project area is part of the world's second largest tropical humid rain forests after Amazon the entire landscape is composed of old growth forests over hundreds of years with over 600 species of trees. These forested landscapes, has received global attention as these can sequester carbon to a great extent. The huge forested landscape is home to Mammal's: 31 species Birds 36 species, Reptiles 4 species, Amphibians 13 species, Fishes 84 species, Molluscs 43 species, Plants 95 species.

HCV3. The forested landscape contains several rare, threatened or endangered species,. which are threatened mainly due to land use activities such as mining, slash and burn agriculture, construction of logging roads, and commodity based urbanization. These developments has damaged the habitats of several endemics species such as Bonobo, Dyras monkey, Gorilla, Chimapnzee, okapi and various floras to threatened catergory.

HCV4. The Congo River, formerly Zaire River is the chief drainage system in REDD+ Project area. It raises in the Katanga plateaus and flows north and south in a great arc crossing the equator line. The river flow's southwest to join the Atlantic Ocean near Matadi and Banana. It is second longest and deepest river in the world. In Sankuru province, the chief rivers are Sankuru, Lomami, Lubefu and Lukenie. The chief rivers of Tshopo is Congo river, Lomami and Yambuya, The Tshuapa river is the chief hydro source of Tshuapa and in Equateur the major river is Congo and Lulonga (World Bank, 2017). The overall length of the Congo River is 4380 km thus making second longest river in the world. The Uele forms at the confluence of the Dungu and Kibali rivers which originates in the mountains near Lake Albert. These rivers join Mbomou River at Yokoma after travelling around 750 miles. The main tributaries to the Uele river are Bomokandi River and Uere River.

HCV5. Over hundreds of years local's depends on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow fallow period of 5-20 years depending upon soil conditions, land availability and other factors, and returned to clear and cultivate again.

HCV6. Traditionally, the people of this area are called as forest people. They are dependent on the forest resources for their survival, housing and food. These groups are managed by the leaders often called as Chiefs". These are people practice various religious beliefs in the project area and its surroundings.

2.1.8 Stakeholder Identification (G1.5)

KMS field team met and interviewed various stakeholders like community members, Chiefs, Territory administrators, to collect views and feedback on the way to implement an effective REDD+ Program.

The Chiefs were the first contacted by KMS team during November – December 2016. The REDD+ team continuously identified and collected the valuable feedback. The feedback received were analyzed and categorized into main activities supporting the Project. During these initial meetings KMS REDD+ team explained how the Project works and provided communities with opportunities to ask questions, express concerns, and communicates needs or desired benefits. The following list summarizes desired benefits requested by the community. Further, annual reviews were conducted with all chiefs of the respective areas.

The team had visited several major villages and towns across all the identified provinces. The team interacted with the villager's and Chiefs. These meetings were announced through the Chiefs and community informers.

To ensure that an entire community (not just the chiefs) is involved with the Project, understands its implications and has a voice in its development, KMS holds different types of meetings in each village. Meeting types include just the village chiefs, the general populace, and women only meetings to ensure each subset of a community are in an environment in which they feel free to discuss their ideas, opinions, and expectations from the Project.

Through these meetings KMS explained the REDD and how the Project works, as well as to provide communities with opportunities to ask questions, express concerns, and communicate needs or desired benefits. A list of desired benefits identified most commonly by communities is as follows:

- **Education:** The communities have expressed a desire to improve the infrastructure of the schools, provide material and support.
- **Health Care**: The communities want new health facilities to be built or refurbish the existing and medicines to be provided.
- **Food Security**: The communities indicated that they wish to have enhancement of food security.
- **Water facilities**: Communities also expressed lack of proper drinking water facilities in some of their villages and would like KMS to provide better water source such as tube well.

The initial discussions lead directly to the development of community related issues and the relevant Project activities to be addressed by KMS developed to address them. The communities addressed following concerns at the time of consultations during November 2016 – December 2017.

- **Lifestyle Change**: Communities expressed concern about the way the Project will protect the forest and the activities that are being implemented. They questioned that if by protecting forest, the communities will still be able to continue to extract forest products as dead woods for cooking, collection of honey and fishing.
- **Community Benefits Distribution**: Communities frequently asked how benefits setup by KMS are spent and distributed to communities.
- **Extent of Project and Participation**: There were questions about the geographical coverage of ctivities, the participation of local NGOs as may be necessary and the decision-making process.
- **Illegal logging**: Communities expressed that there may be illegal logging and as a result there will be forest loss. Communities expressed their desire to participate in forest patrolling activities.
- **Sustenance agriculture**: Communities are under the impression that slash-and-burn agriculture can be a cause of the decline of the forests and need for improved farming practice.
- **Charcoal collection:** The charcoal collection would be another driver of the forest loss as it would generate money so people may engage in the clearance of forest for charcoal collection.
- **Wildlife poaching:** Illegal wildlife poaching is an important driver for loss of biodiversity.

Poor livelihood: The community indicated that the poor livelihood is an important issue the community face due to lack of facilities, employment alternatives and road network.

The lease agreements signed provides the opportunity to plan and execute the proper actions for the betterment of the communities in the long run. Further, National Ministry of Environment and Sustainable Development, Government of DRC has issued a ruling letter on dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer investor KMS.

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

At the chiefdom level exhaustive meetings were held and the meetings with stakeholders with all the community members during November to December 2016. At territory level meetings for all Chiefs in the territory were conducted during November 2016 - December 2016. Further annual reviews are conducted in all project chief areas. Among the Congolese, the majority community is the Bantu. It is universally accepted in DRC that Pygmies are considered as indigenous people comprising around 1% of the overall population mainly found in Maniema and Equateur, as far as this project areas are concerned. Furthermore, the circumstances and characteristics that distinguish pygmy native people from local communities living in DRC forest environments are both time and space-bound, taking into account the fact that they were the first to occupy certain territories as well as their different cultures and lifestyles related to the exploitation and management of natural resources and notions and applications of territorial economies and politics. Language is not a distinguishing element between pygmy native people and local communities in the DRC. Hence to address the community benefits and quantify the impact of such benefits, the project identifies the stakeholders as local communities comprising of both the Bantu and Pygmy community and further categorizes vulnerable community as the women in both the Bantu and Pygmy communities.

This categorization is in line with the DRC Forest Code, which defines that a local community is ‘a population traditionally organized on the basis of customs and united by bonds of clan or parental solidarity that are the foundation of internal cohesion. In addition, it is characterized by its attachment to a given land’. To this definition are added aspects of social organization, language and beliefs that are important elements in the determination of a local community. This law does not, however, establish the difference between ‘indigenous peoples’ and ‘local communities’, considering all groups of people (native pygmies or local) that have these common characteristics as ‘local communities’ of a given site or territory. Accordingly, indigenous peoples are also considered to be integral part of and organized in local communities, distinct from considerations of political authority. However, as it is assumed that the project will not impact all the community members equally. Additionally, the project will target interventions for some community members and not others. The purpose of dividing the

larger community into smaller sub-sections is to be able to better describe and monitor how the project impacts them. The table below summarizes the identified stakeholders.

Activity	Outcomes	Impacted stakeholders
Improved knowledge, enhanced awareness and importance of the biodiversity and habitats conservation by training	Improved natural resource management, and overall improvement in environmental governance	All the participants in the training program. Particular benefits to people in decision making and governance roles such as chiefs and village elders.
Better access to educational infrastructure for the deserving community By refurbishment of educational facilities	Increase in the number of children attending school regularly. Better facilities would lead to higher number of educated individuals in each village.	All children in the school going age in the community.
Renovation of bore wells will provide better access to clean drinking water for the deserving community.	Reduction in number of water borne diseases in the community as open sources for drinking water need not be depended upon. Saves time as community does not need to travel far for their water needs.	All community members who do not have access to adequate nearby safe water resources and are vulnerable to water borne diseases.
Refurbishment / Maintenance of Health care facilities will provide better access to health facilities and improve existing infrastructure.	By having access to good health facilities there will be an improved response time in treatment of illness and such facilities can treat more number of patients.	All community members who do not have access to adequate health facilities and are vulnerable to diseases. Especially the poor community.
Patrolling will ensure the conservation and protection of forest areas and will substantially reduce illegal activities which reduce the forest cover. Further this will provide a means of short term employment.	The conservation activities will enhance the natural resource management, environmental governance and overall provide better livelihood by providing employment.	Community members who are unemployed
The objective cook stove distribution is to provide better access	By cooking in the improved cook stoves, the households will be	Community members include Women, Men and Children who lack access to improved cooking

to improved cooking facilities, improve health and reduce the dependence of firewood from the forest which is used more in traditional cooking methods.	able to save time on the amount of firewood collected and the indoor air quality will also improve which will decrease indoor air pollution related diseases.	facilities. Particularly beneficial to women of the community who are identified as vulnerable
The objective of promoting community fish ponds and distribution of vegetable seeds will be to provide enhanced food security and improved agricultural practices. Hunting wildlife is also expected to decrease.	By promoting community fish ponds in villages, the people will have an alternative method of high protein food which will also reduce the dependence on hunting. By growing the vegetables themselves, the household will be able to save on the expenditure and also improve productivity of their agricultural land by also growing non-traditional crop varieties.	Community members who are entirely or partly dependent upon wildlife for food and practice hunting. Community who practice farming. Women, Men and Children who do not have access to sufficient source of nutrition and lack adequate food security.

2.1.10 Sectoral Scope and Project Type

The applicable VCS sectoral scope for the project is "14 Agriculture, Forestry and Other Land Use (AFOLU)", under the Reduced Emissions from Deforestation and Degradation (REDD) project category. The project activities are designed to Avoided Unplanned Deforestation (AUD) occurring in a mosaic pattern. This Projec is envisaged as a grouped project.

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

This Project has identified numerous activities to address the mitigation of climate change in the six provinces of the DRC. Below are the activities that has been proposed, finalized and in the process of implantation. These activities also address the theory change in the Congolesse people which help them to adopt to the changing scenario's from the baseline assessment.

Activity	Objective	Outcomes	Benefits to community
Training and awareness Programs	Improved knowledge, enhanced awareness and importance of the biodiversity and habitats conservation.	Improved natural resource management, and overall improvement in environmental governance	Long term climate benefits due to effective implementation of the project

			objectives which will lead to overall wellbeing of the communities.
Construction, Renovation and refurbishment of existing schools in selected villages of the provinces	Better access to educational infrastructure for the deserving community.	Increase in the number of children attending school regularly. Better facilities would lead to higher number of educated individuals in each village.	Long term benefits on improved access to education and overall better livelihood as employment opportunities are expected to increase.
Clean drinking water	This activity will provide better access to clean drinking water for the deserving community.	Reduction in number of water borne diseases in the community. Saves time as community does not need to travel far for their water needs.	Long term benefits on improved health and overall better livelihood.
Refurbish, and/or maintain health care facilities	This activity will provide better access to health facilities and improve existing infrastructure.	By having access to good health facilities there will be an improved response time in treatment of illness and such facilities can treat more number of patients.	Long term benefits on improved health and overall better livelihood.
Monitoring and patrolling of the forest areas	This activity will ensure the conservation and protection of forest areas and will substantially reduce illegal activities which reduce the forest cover. Further this will provide a means of short term employment.	The conservation activities will enhance the natural resource management, environmental governance and overall provide better livelihood by providing employment.	Long term climate benefits due to effective implementation of the project objectives which will lead to overall wellbeing of the communities. Conservation of biodiversity.
Distribution of cook stoves with improved efficiency	The objective of this activity is to provide better access to improved cooking facilities, improve health and reduce the dependence of firewood from the forest which is used more in traditional cooking methods.	By cooking in the improved cook stoves, the households will be able to save time on the amount of firewood collected and the indoor air quality will also improve which will decrease indoor air pollution related diseases.	Long term benefits on improved health and better livelihood.

Promote establishment of fish ponds & Distribution of vegetable seeds	The objective of the activity will be to provide enhanced food security and improved agricultural practices. Hunting wildlife is also expected to decrease.	By promoting community fish ponds in villages, the people will have an alternative method of high protein food which will also reduce the dependence on hunting. By growing the vegetables themselves, the household will be able to save on the expenditure and also improve productivity of their agricultural land by also growing non-traditional crop varieties.	Long term benefits on food security, improved health and better livelihood. Conservation of biodiversity.

Table #2 – The list of Project acitvites of "National REDD+ Project in the Democratic Republic of Congo".

2.1.12 Sustainable Development

The KMS REDD+ Project has been designed to achieve benefits as defined by the nationally stated sustainable development priorities including monitoring and reporting the Biodiversity and other natural resources. Following are the details:

Climate change mitigation

The project will avoid forest emissions by 155243885277 tCO2e (lifetime).

Awareness Training

Awareness trainings are being conducted. Training is an on-going activity at the community level.

Enhanced Well-being:

This REDD+ project has enhanced the livelihood by providing work to manufacture improved cookstoves. All improved cookstoves distributed in the project areas are manufactured in the provincial capital so that local employment is provided and self-help ladies groups and women NGOs are benefited from preparing ceramic parts for improved cookstoves. During trainings communities are encouraged to practice climate-smart agriculture and food security measures without affecting the protected forests adversely. This project primarily focus on the eleviate the community experience of well-being with improved health care facility, educational facility, improved cooking & clean environment, food secutiry, better governance of the natural resource management, forest resources, biodiversity conservation & protection of the habitats.

Distribution of Improved Cookstoves (ICS):

The KMS REDD+ Project has distributed improved cookstoves in around 30 most deserving villages in the six provinces. In the majority of the villages, photos are taken for each beneficiary at the time of improved cookstove handover and briefing on the use of ICS. KMS has already distributed around 1300 improved cookstoves in the project area. We have plans to disburse locally-made improved cookstoves manufactured by women associations in association with local craftsmen. The improved cook-stoves will also help benefit the community with less emission and provide health benefits. The cookstove distribution program will continue until we complete the distribution for all the villages identified and falling within the leakage management area.

Monitoring and Patrolling

The local community groups in each Chiefdom have been monitoring and protecting the high-conservation value forests biodiversity & their critical habitat by identifying several patrolling guards in the Chiefdom area and patrolling the REDD+ project area under the Chiefdom at least once in a year. This helps in preventing activities such as illegal logging illegal mining anthropogenic fires and forestland grabbing.

We choose Okapia johnstoni (aka Okapi) as a trigger species. Since 1980 expansion of human settlement deforestation and forest degradation has eliminated important portions of the Okapi range (Hart 2013). Okapi is the most prized bush meat (Nixon 2010). In the past due to the presence of illegal armed forces around the protected areas prevented any conservation actions. Therefore Okapi population has undergone a drastic decline in the numbers over decades and has been classified under the IUCN Red list category and criteria as Endangered A2abcd+4abcd Ver 3.1 in 2015.

Since the inception of the REDD+ project in DRC, the KMS teams have been monitoring the Okapi through patrolling and creating awareness among the villagers on the ecological importance of the Okapi presence. The monitoring and patrolling have offered protection against deteriorating habitat and hunting which is translating into an increase in the population.

The monitoring and patrolling will continue and lasts for the entire REDD+ project lifetime.

Enhanced food security

This project has been working towards providing the enhanced food security to the communities by creating the fisheries pond in some relevant villages which are not having any water resources like river and canals nearby including vulnerable and marginalized households. This activity will span for several years until we complete all the relevant villages.

Drinking-Water

This project intends to provide clean water bore wells in the identified and relevant villages for providing good drinking water.

Enhanced Health

This project has been working towards construct, rehabilitate and/or maintain health centers and medical facilities in the project area. We have already started to support a health center in the province of Tshopo. A health center has been renovated in the sector of Banalia-Bangba Banalia Territory Tshopo province.

2.1.13 Implementation Schedule (G1.9)

The KMS REDD+ Project has identified following milestones as a part of the project development and implementation. The details are as follows:

Date	Milestone(s) in the project's development and implementation
October - December 2016	The Chiefs were the first contacted by KMS team during November – December 2016. The REDD+ team identified and collected the valuable feedback.
	Stake holder's identification, consultation and feedback.
October - December 2016	Identification and finalisation of REDD+ activities.
October - December 2016	Signing of lease agreements, right of use agreements between land owners and KMS.
Q2 / Q3 2017	Socio-Economic & Bio-diversity Survey.
Q2 / Q3 2017	Identify sample plots and measure carbon stock.
1-January-2017	Commence patrolling activities.
1-January-2017	Commencement of implementing REDD+ project activities and cook stove distribution.
May 2018 to March 2021	Obtain the relevant approvals from Government of DRC
September 2020 to March 2021	Initial submission of VCS+CCB PD and VCS MR to VERRA for initial review.
January 2021	Identify and finalise agreement with Validation and verification body
	Submit VCS+CCB PD and MR for initial review and pipeline listing.
	Update the documents as per the VERRA feedback.

Table #3 – The list of Project acitvites of "National REDD+ Project in the Democratic Republic of Congo" and the timelines.

2.1.14 Project Start Date

27-June-2017.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The KMS REDD+ Project has commenced its activities as stated in the section 2.1.11 from 1-June-2017 and continue till 26-June-2117. The GHG Crediting Period therefore 100 years (2017-2116) during which income from carbon payments during this period will be used to further develop and implement surveillance and social activities that will yield net positive impacts to the climate, communities, and biodiversity of the area, on a consistent basis and sustainable.

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

There are no differences between the duration assessment periods of GHG emissions accounting, climate adaptive capacity and resilience, community, and biodiversity assessment periods.

2.1.17 Estimated GHG Emission Reductions or Removals

The following table shows the estimated GHG emission reductions for the current project.

Year	Estimated GHG emission reductions or removals (tCO_2e)
2017	697071442
2018	1514471920
2019	1514166204
2020	1513690647
2021	556665230
2022	1547868375
2023	1547868375
2024	1547868375
2025	1547868375
2026	1547868375
2027	1582283882
2028	1582283882
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2110	1582283882
2111	1582283882
2112	1582283882
2113	1582283882
2114	1582283882
2115	1582283882
2116	1582283882
2117	1582283882
Total estimated ERs	155243885277
Total number of crediting years	100
Average annual ERs	1559409567

Table #4 – Estimated GHG reductions or removals.

2.1.18 Risks to the Project (G1.10)

The KMS REDD+ Project has identified following risks and mitigations to this Project.

Human induced risks:

Slash and Burn and/or Unsustainable Agriculture: The Project Zone is undergoing pressures for new agricultural land from the expanding population. Therefore, slash and burn agriculture is a primary risk to the REDD+ Project benefits and thus to the Project's sustainability. The Mitigation for this risk is through the Project Activities, mainly in the form of increased protection of the Project Area for the creation of better community standards through the promotion of awareness creation and sustainable ways of living.

Charcoal production and illegal logging: The Project areas are vulnerable to extractive activities, including the production of charcoal and illegal logging. These are additional threats of deforestation and degradation in the REDD+ Project Area which are a significant risk to the Project's climate benefits. Patrolling by community members in the Project area and thus attempt to halt such activities.

Anthropogenic fires: The Anthropogenic fires occur some times a year in the project area. These are set intentionally with the goal of clearing trees and bush for agriculture or some may be the unintentional result of illegal activity, such as charcoal production. KMS Project representatives monitor the Project area for the occurrence of fire, and work to reduce the risk of fire. In addition, the Project aims to reduce illegal incursions of people into the Project Area, thus mitigating anthropogenic fire occurring potential.

Natural risks: The region in which the Project is located is not generally susceptible to severe or destructive natural events. The primary types of natural events that could occur would be geologic events, pests or disease, flooding, or fire. The area is not prone to any geologic activity and poses little to no risk to the Project. As the Project Area is a native and biodiverse ecosystem the risk from pests or disease, that result in significant emissions reversal is low. The primary mitigation for this risk is to maintain the forest and ensure through monitoring that the trees and ecosystem remain healthy and intact. There can be minor seasonal flooding from the annual monsoons. However, the species of this area are all adapted to the hydrological cycles and are not liable to monsoonal flooding.

Political risks: Generally, in most countries, there exists a possible risk of shifting legislation or the potential of new policies that could potentially affect natural resource management and/or land tenure. There could be chances in the DRC as well any potential change in legislation will have minimal effect on the REDD+ Projects, since this is a community based and community driven Project activity. Additionally, as the intent is to nest this Project into a future jurisdictional/national program, the Project's visibility will only increase as well as its importance to the all relevant approvals are obtained from the National government country of DRC.

Policy risks: Insufficient revenues: The majority of REDD+ credits are currently sold on the voluntary market, posing a risk to recurring, sustainable income flow. If credits are not sold, there will be no revenue, and thus no monetary support for the Project over its 100-year lifetime, save initial investment. Nevertheless, the Project proponent believes that the Project will be successful in attracting sufficient buyers to buy good number of carbon credits. In case if the land owner wish to change the land use pattern from REDD+ to some other usage. Hence, considerable amount of derisking is already in place.

Reversal risks: Risk of Project reversal due to community opposition is considered minimal, as they have openly and widely been consulted through numerous outreach and information-

sharing meetings throughout Project development. As a Project governance policy, all stakeholders are always able to seek further information or air grievances if necessary. The Project will continue to engage all the relevant communities, provide education and support for community social services, and improved livelihood opportunities on a continuous basis through out the project life time.

Infrastructural enhancement: The infrastructural enhancements such as development of roads, construction of dams, power stations, mobile network enhancements etc might impact on the KMS REDD+ project. However, based on the past events, nature of the project area in a remote place, less population density the risk due to infrastructure enhancement is negligible.

2.1.19 Benefit Permanence (G1.11)

Throughout the project cycle, a system of management and governance will be created in the community. In conjunction with the long term benefits of training and awareness related to conservation of the habitat, this will lead the community developing and maintaining the project initiatives which provide benefits beyond the project lifetime. A number of long term climate, community and biodiversity benefits which are planned to be created throughout the project lifetime which will prolong the project benefits are indicated in the theory of change, section 2.1.8. For specific interventions such as cook stoves, replacement or maintenance to ensure the benefit permanence will be a part of the manufacturers and supplier responsibility beyond the project lifetime. A robust mechanism of reporting of the complaints and redressal of issues will be implemented during the project lifetime, which will ensure that such practice is followed. For other activities such as renovation of schools and bore wells, maintenance will be by means of the system developed by the Chief's during the project lifetime, which will enable the community members to reach out to the respective Chief's in case of any grievances. Overall, the training, employment and other climate and biodiversity conservation benefits provided during the project implementation will enable a more robust governance and management structure at each chiefdom level by which the community themselves realize the benefits and become responsible for ensuring that they are permanent.

2.1.20 Financial Sustainability (G1.12)

The initial investment will be made by the Project proponent Future Project implementation costs will be covered by the sale of the carbon credits corresponding to the emission reductions achieved from time to time.

2.1.21 Grouped Projects

The KMS REDD+ Project is envisaged as a grouped Project. The inclusion criteria for addition of any new instances are summarized in the below section i.e., 2.1.21.1.

2.1.21.1 Eligibility Criteria for Grouped Projects (G1.14)

The KMS REDD+ Project is envisaged as a grouped Project. The inclusion criteria for addition of any new instances are as summarized as below:

No.	Eligibility criterion - Category	Eligibility criteria and how it will be met at the time of inclusion
1	Geographic Boundary	The geographical boundary of the new instance must be within the Democratic Republic of Congo (DRC). Detailed documentation regarding the exact geographical location such as GPS coordinates will be necessary
2	Ownership	Similar criteria as stated in the section 1.7 of the VCS PD will be applicable, based on which the relevant new project areas will be included into the project.
3	Approval and authorization	Approval and authorization as mentioned from time-to-time. However, the present Government requirements as mentioned in 1.7 of the VCS PD.
4	Double Counting	Emission reductions claimed by each of the instances under the grouped project should be unique and not counted more than once. The unique geographical location can be cross verified which will ensure that there is no double counting. The same will also be verified through Undertaking from the PP confirming that instance is not an individual project or part of any other grouped project.
5	Start Date	Date on which activities conforming to the definition of start date as per VCS requirements in the instance were started, which shall be after start date of the grouped project.
6	Applicability of the methodologies	Latest version of methodology VM0015 and its associated tools shall be applicable.
7	Additionality	Criteria as specified in the grouped project document shall be met
8.	Classification of land cover types	Criteria as specified in the grouped project document shall be met
9.	Baseline scenario establishment	Criteria and steps as specified in the grouped project document shall be met
10.	Quantification of GHG emission	Criteria and steps as specified in the grouped project document shall be met
11.	Monitoring of GHG removals	Criteria and steps as specified in the grouped project document shall be met
12.	Community and Biodiversity benefits	Shall broadly follow the approach as specified in this project document for ensuring that the overall long term and short term benefits of the grouped project are met.

Based on the above criteria, the validation of any new instances will be done.

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

No scalability limits are applicable. The project acitivity is highly critical to the environment, communities and Biodiversity irrespective of scale inview of the prevailing attributes of the project area.

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

This Project is designed to generate the positive long term effects on the community, climate and biodiversity. The Project team's analysis indicates that there are no additional risks to the grouped Project other than the ones mentioned in the section 2.1.12 of this document.

2.2 Without-project Land Use Scenario and Additionality

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

As per the assessment, we found the characteristics that lead to deforestation and degradation are lack of awareness, slash and burn agriculture, fire wood collection, logging, commodity driven urbanization, anthropogenic and wild fires. The identified baseline scenario is conversion of native ecosystems from a natural forested land cover to a non-forest or agricultural state. The baseline scenario outlined in the VCS Additionality Tool demonstrates that the Project Accounting Area would be converted to Conversion of forest land to cropland for subsistence farming, Conversion of forest land to settlements, Conversion of forest land to infrastructure, including new roads, Logging of timber for commercial sale (e.g., wood planks or poles for commercial sale), Logging of timber for local enterprises and domestic uses, Wood collection for commercial sale of fuel wood and charcoal, Fuel wood collection for domestic and local industrial energy needs (eg, cooking, home heating, tobacco curing, brick making), Cattle grazing in forests, extraction of understory vegetation (eg, thatch grass collection for roof and livestock bedding materials, shrubs and small trees for straw fences. In general, the conversion of forest to non-forest is significant.

2.2.2 Most-Likely Scenario Justification (G2.1)

The steps described below are in accordance with the "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" 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. Refer to VCS PD for more details.

2.2.3 Community and Biodiversity Additionality (G2.2)

According to the social and biodiversity impact assessment, benefits to communities and biodiversity in the absence of the Project would be limited and/or almost not possible. There are multiple protected areas throughout Democratic Republic of Congo and also adjoining the Project area. Most of these areas were declared protected areas through International/National support and continue to be subjected to significant deforestation with the activities identified in baseline scenario. In the without-Project scenario, there has been a push for resettlement adjacent to protected areas, but the government support to provide resources to benefit communities and biodiversity is very limited. There has been a lack of community development initiatives around the protected areas which leads to the destruction rather than protection of natural resources. This leads to significant financial, technical and institutional barriers to implementation of Project activities such as income generation, agricultural training and forest and biodiversity protection.

Finally, the Project will develop and implement activities not only for ecosystem protection but also to generate social benefits which cannot be generated in “without Project scenario”.

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

Not applicable

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

All the relevant documents, information and records will be available on the VERRA website which is already informed to all the communities. Further, KMS from time to time provides all relevant chiefs and communities the updates and Project documents ((http://www.nationalreddplusprojectdrcongo.org/). Additionally, relevant information, records will be made available on the Project website in due course of time. The requirement of language preference is kept in mind. It is not always possible to expect all community members to possess internet connection. The hard copies of the project and relevant documents are made available with the Chief through KMS representatives. Chiefs in turn disseminate the relevant information to the communities with the cooperation of KMS representatives. Further it is informed that the project team in DRC verifies from the community during the informational meetings, that the project information has been made available to them.

2.3.2 Dissemination of Summary Project Documents (G3.1)

All relevant documents and results will be published in the Project website and communicated in the relevant local languages in a simple language to the stakeholders for their awareness and free participation. It is not always possible to expect all community members to possess internet connection. The hard copies of the project and relevant documents are made available with the Chief through KMS representatives. Chiefs in turn disseminate the relevant information to the communities with the cooperation of KMS representatives. Further it is informed that the project team in DRC verifies from the community during the informational meetings, that the project information has been made available to them.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Regular informational meetings are held with all Chiefs and community, once in a year at least. All relevant community groups, village heads, along with Chief participants in such informational meetings along with KMS representatives. The project has already conducted informational meetings and will continue to do with all Chiefs as part of the FPIC framework of the project. All the meetings at the Chiefdom level are chaired by the respective Chiefs. Village heads, community from various villages including women and children do attend. Total number of people could be anywhere between 25-100. Details of such meetings will be submitted to VVB upon request. As part of the FPIC process, the consultative meetings were held in all the Chiefs. Every village head is required to conduct informational meeting at least once in a year to discuss the project objectives implementation and monitoring. Details of such meetings will be submitted to VVB upon request.

KMS project team will continue to have informational meetings by meeting the respective chief’s in their respective Chiefs at least once in a year. As may be necessary, common meeting of chief’s in a particular territory or in a province is being held to discuss specific any specific

matters. Apart from the DRC Head of Operations and his team, each province is looked after by a focal point (totally 06). Under the provincial focal point, various team members work territory wise and chiefdom wise. The focal points may also take the assistance of temporary staff for any specific works. Formal worker relationship agreements are also signed with various NGO's and will be utilized as necessary. Only local persons who are born and bought up in these areas and working in the social sectors / NGO / community development background are selected. The project management structure is depicted in figure 9 of section 2.4.1. Details of such employment will be provided to VVB upon request.

The project is having one full-time working Director-Operations, along with six focal points for all six provinces to carry out the necessary activities on a continuous basis. Additionally, during several months in the year part-time task specific hiring of local experts is being done. Community members are employed for patrolling activities for climate and biodiversity conservation.

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

The relevant Project information about the potential, costs, risks and benefits was exchanged and discussed during the meetings at the Chiefdom level and individual village level supervised by the respective Chiefs and KMS representatives before the start of the REDD+ Project implementation. Extensive participatory and transparent public community meetings were held and inputs and opinions were collected at all levels in the Project areas. The information obtained from each meeting is analyzed by the KMS DRC representatives on the ground and communicated to the DRC Operations Director/Bengaluru, which is being acted upon as necessary. Views and feedback are almost consistent since challenges and living standards are almost same across the Chiefs. The activities which provide the short term and long term benefits have been planned taking in to account the needs of the community. Hence community feedback was also used in the improvement of project design.

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

All relevant chiefdoms and administration have been informed through various communication channels about the VCS+CCB validation and verification. Local and community radios are also used for dissemination of information about the objective of the REDD+ project and VCS+CCB validation and verification. Public notices are displayed at all relevant places within the project areas.

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

The KMS will actively communicate with community members and stakeholders about the start of the audit process and the methods with which they can submit comments on the Project to auditors/VERRA. This will be accomplished by communicating the validation and verification field visit dates to relevant stakeholders, community leaders, and public officials. All are requested to pass that information onto their communities and relevant person/entities. The Project representative will arrange for community meetings with all stakeholders during the validation and verification site visit consultations.

2.3.7 Stakeholder Consultations (G3.4)

The Project designed its activities based on the results of the inputs received from communities and other stakeholders. It was intended since the beginning to develop activities that were tuned with local livelihoods and the best way to do so was by first consulting with local stakeholders. All Project activities are based fundamentally on local customs and needs. For instance, women requested the cook stoves as during the rainy season, they were unable to cook outside (traditional practice) therefore; KMS incorporated this feedback and planned distribution of improved cook stoves as high priority.. Among the other needs, the community also identified and given the feedback about the need for better clean drinking water, enhanced food security, health care and educational facilities. The information obtained from each meeting is analyzed by the KMS DRC representatives on the ground and communicated to the DRC Operations Director/Bengaluru, which is being acted upon as necessary. Views and feedback are almost consistent since challenges and living standards are almost same across the Chiefs. The activities which provide the short term and long term benefits have been planned taking in to account the needs of the community. Hence community feedback was also used in the improvement of project design.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The process of communication is continuous throughout the lifetime of the Project which will be maintained through Chiefs of the respective Project areas. This will establish a commitment with community members, and relevant stakeholders. Action plans on ground may be modified or amended based on the inputs received on the ground. The information obtained from each meeting is analyzed by the KMS DRC representatives on the ground and communicated to the DRC Operations Director/Bengaluru, which is being acted upon as necessary. Views and feedback are almost consistent since challenges and living standards are almost same across the Chiefs. The activities which provide the short term and long term benefits have been planned taking in to account the needs of the community. Hence community feedback was also used in the improvement of project design. Further, the project team in DRC has ensured that the community members are aware of the project status during their periodic visits by cross-checking with community directly.

2.3.9 Stakeholder Consultation Channels (G3.5)

As part of the FPIC process, the consultative meetings were held in all the Chiefs. Every village head has conducted informational meeting at least once in a year to discuss the project objectives implementation and monitoring. Details of such meetings will be submitted to VVB upon request.

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

To ensure effective participation of the communities it was important to hold meetings and workshops during time periods where stakeholders could attend. As such, all meetings and/or workshops were held during the day and at times when other work did not interfere with full community participation. Invitations to be sent to all community members through Chiefs within a respectful timeframe and in such a manner that stakeholders could respond.

2.3.11 Anti-Discrimination Assurance (G3.7)

The Project will be continuously committed to fair treatment and equal opportunity for all Project stakeholders, community members and employees. The Project, nor any agent of the Project, will discriminate or exploit or harass against any person for any reason, including, but not limited to, gender, religion, nationality, tribe, or sexual identity. The Project has established an equal opportunity policy that ensures that the Project will not engage in or be complicit in any form of discrimination. The Project team is committed to providing a workplace and programs that are safe and free from all sexual harassment or sexual advances.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

The Project strives to minimize the possibility of conflicts and grievances by maintaining close linkages between and working proactively with communities and stakeholders throughout the Project areas. The Project additionally has an open-door policy, encouraging community members, stakeholders and employees to visit or contact Project Office in DRC, which is located at Kisangani and discuss any issues or feedback directly with Project staff.

All conflicts and grievances if any will be attended to with a maximum of one week time by discussing with the relevant parties/people. All efforts are made to resolve the conflict/Grievances peacefully without going to any courts. In case of extreme circumstances, the community can reach Government and its authorities for the resolution. The steps/details has been updated in the grievance redressal procedure and circulated.

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

Due to relatively large size of the project area, communities are informed to contact relevant village heads for any grievances redressal. The next level for redressal is the Chief of the Chiefs. In case of future issues KMS senior staff will look into the matter for peaceful resolution.

However, KMS DRC staff is always available to resolve any grievances at the earliest possible. All the feedback and grievances, solutions given will be available with the DRC project office, Project team and Chiefs. Any relevant who wish to refer to can be accessible through Project office in DRC.

Figure #6: Grievance redressal procedure.

2.3.14 Worker Training (G3.9)

The Project activity is designed to provide training to local villagers that will generate the required capabilities to undertake forest monitoring and protect biodiversity. The local villagers who wish to participate in the monitoring program will receive free training in methodologies and procedures to monitor the Project area and report findings. This activity will have rotational workforce for two reasons mainly due to offer some chances for local villagers willing to engage in the monitoring activities and to ensure capacity building for a bigger number of settlers. Special attention will be given to make sure that under-represented groups (elder people,

woman and children) are aware of the on-going training workshops and activities. Relevant Chiefs of the Chiefdoms play an important role in advising and closely working with KMS Chiefdoms and local capacity is always motivated satisfactorily irrespective of staff turnover.

2.3.15 Community Employment Opportunities (G3.10)

The Project owes the responsibility for the fair treatment of all, representation for all Project Zone groups, and encouraging diversity within Project staff and management. KMS policy stresses equal opportunity for all groups, including members of ethnic minorities, various socio-economic groups, genders and sexual orientations, for all employment positions and for inclusion in REDD+ program activities.

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

The KMS will adhere to all local laws and regulation which are related to local worker rights. The following laws apply:

Employment Law (Law number 015/2002) and the following Ministerial Decrees:

Ministerial Decree Number 070/0016, August 11, 2970 on working conditions;

Ministerial Decree Number 68/13, May 1968 on women's wages and working conditions;

Ministerial Order Number 12/CABMIN/TPS/AR/KF/059/02, September 27 2002 on determining implementing measures of:

Ministerial Order number 080/2002 July 3, 2002 on establishing a minimum wage; and

Ministerial Order Number 12/CAB.MIN/116/2005, October 26, 2005 on employee dismissal procedures.

2.3.17 Occupational Safety Assessment (G3.12)

Project's activities do not hold risk besides those inherent to the day a day life in the forest. Project activities do not require the use of heavy machinery or dangerous substances. Nevertheless, the Project management team will provide adequate protection equipment to representatives working in forest monitoring activities. Also, monitoring staff will be equipped with first aid kits. Protection equipment will include but will no be limited to:

Hard hat • Reflective/fluorescent security vest • Rubber boots • Gloves • Fast-dry uniforms • GPS • camera • Field backpack • LED Flashlight • Whistle • Machete • Pocket knife • First aid kit.

Risks for each type of work will be assessed and safety guidelines will be developed to help identifying and reducing such risks. Guidelines will be written in clear and adequate local language and distributed among workers. Additionally, workers will receive safety inductions to make sure any doubts and suggestions are taken care of.

The KMS ensures that workers' health and safety are protected to the best of the Project's ability always and across all project areas. Risks are identified, mitigation strategies produced, and appropriate measures adopted to minimize any risks.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

Kanaka Management Services Pvt ltd (KMS) is the Project proponent and the entity that provides funding to develop, implement and run the Project. The KMS has a robust structure to achieve its key Objective of the project i.e., to generate the high quality REDD+ credits.

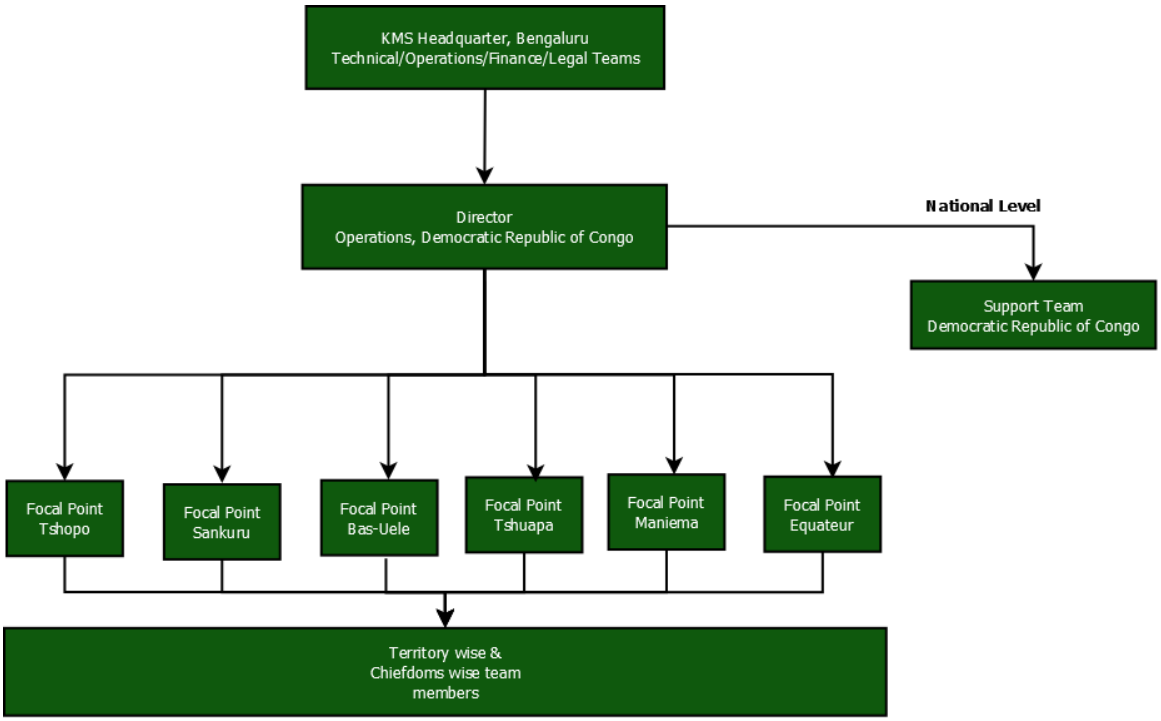

Figure #8 – The KMS REDD+ project governance structure.

2.4.2 Required Technical Skills (G4.2)

The key technical skills required to implement the KMS REDD+ are an understanding of the science of remote sensing, biomass sampling, and conservation biology, experience implementing community and livelihood development programs, effective forest protection enforcement through monitoring and overall Project management. The KMS team has tremendous experience in managing such activities over a decade. The KMS teams were instrumental in providing consultation to the REDD+ Project in various countries like Brazil, PNG etc...under the VERRA the scheme such as VM0015. Please see the section 2.4.2.1 for more information in this document.

Key Function	Organization involved	Type of organization	Brief description of activities
Project Administration	Directors of Kanaka Management Services Pvt. Ltd.	Project developer & Consultants	Project administration Financial planning Market research Project prospecting Administration and distribution of funds Periodic review of project progress Dispute and grievance management Appointment of project design, operations and field team Increase local capacity where possible Support to Operations & AFOLU team
Project design and operations	Operations team of Kanaka Management Services Pvt. Ltd.	Project developer & Consultants	Design and implementation of project Planning and scheduling of monitoring activities Review and check of field data and technical parameters Preparation and Maintenance of project monitoring records and project documents Compliance of project to methodology and VCS and CCB requirements Liaise with field team on a regular basis to track project progress and

			development
Community engagement and monitoring	Field team / representative of Kanaka Management Services Pvt. Ltd.	Project developer & Consultants	Organise and conduct informational meetings and trainings Distribution of benefits in line with the community plan Collection of field data relevant to community monitoring and communicating to the operations team Communication of any grievance and disputes to the operations team
Forest management and monitoring	Field team / representative of Kanaka Management Services Pvt. Ltd.	Project developer & Consultants	Organise and conduct informational meetings and trainings Reporting of any illegal activities Collection of field data relevant to Climate and Biodiversity monitoring and communicating to the operations team Regular patrolling

Table #5 – Table showing required skill set towards the Project implementation.

2.4.3 Management Team Experience (G4.2)

Skillset	Identified Resource Person
Remote sensing, GIS & AFOLU.	**Mr. Bipin Charles – Director, RS, and GIS & AFOLU** - Bipin Charles has a Bachelor's in Botany, Zoology & Environmental Science and Master's in Environmental Science. Bipin is having around 22 years of industry experience. His research and teaching interests include conservation planning of various species, Biodiversity assessment, and risk assessment of invasive species and applications of Geographical Information System & Remote Sensing in conservation biology. He has more than 10 years of experience in managing various GIS and Remote Sensing Projects. He has extensive experience in managing GIS and RS Projects viz., Land Use Land Cover change modelling, and time series analysis of Land surface temperature, digitization, and spatial analysis. He has been a key resource for training RS and GIS modules in various reputed universities and institutes in Asia. He has completed around 30+ training workshops on RS, GIS and species distribution. He has the distinction of winning various fellowships and grants programmes related to conservation, ecology, and environment. He has various technical publications to his credit since many years.

Community and livelihood development programs, stake holder engagements, carbon stock measurements, monitoring and patrolling for Biodiversity and forest protection, and REDD+ project activities.	**Mr.C.M.Jean, Director of KMS DRC Operations** Jean is a qualified Engineer with around fifteen years of professional experience with a particular focus on natural resource management. Born and brought up in DRC, he has obtained his Bachelor degree from University of Lubumbashi, DRC and a Master degree from Tshwane University of Technology, Pretoria, South Africa. During the last fifteen years he is involved in various Non-Governmental Organizations and educational institutes with a focus on community development, sustainable management of natural resources, sustainable rural livelihood transformation along various activities related to rural communities. Jean is involved in various stake holder consultations, socio-economic surveys, biodiversity surveys and sensitizing local communities to the objectives of REDD+ programs. He possesses good communication, planning, liaison skills and along with good manpower management skills. He maintains good relationships among various stake holders in REDD+ project establishment and successful implementation. He is a proven Manager in establishing conflict free operations environment with adequate foresightedness. He has working experience in knowledge building, capacity enhancements, team building, planning, relationship management, organization of the community trainings, and continuous improvement initiatives in the operations of REDD+ program. He is proficient in French, English, Lingala and Swahili with average language skills in Afrikaans. **Mr. BL Ledoux, Focal point for Tshuapa Province** Ledoux is born and bought up in DRC. He holds Bachelor's degree in Economics from the University and Cepromad, Mbandaka, Equateur. He has fifteen years of experience in various Rural developmental activities, natural resource management, sustainable natural resource management, and livelihood transformation activities. As a focal point of the Tshuapa Province, he has served as a lead in various capacity building programs, land-use planning, socio-economic surveys', biodiversity surveys, economic aspects of the forest resources, sensitizing the local communities to REDD+ objectives. He possesses excellent communication skills, man power management, relationship management, peaceful conflict resolution, community trainings and local language skills such as French, Lingala & English. He is proficient in Computer skills viz., Microsoft Office products and computer maintenance. He is an excellent large scale team manager with an ability to motivate the teams to achieve project objectives.

	Mr. CL Muna – Focal Point for Equateur province Muna holds Bachelor's and Master's degree in Rural Development with specialization in Environment and Sustainable Development. Since last twenty years Muna was involved in activities such as social welfare, enhancing food security activities, livelihood transformations of rural communities through adopting sustainable agroforestry activities, forest inventory technician with WWF, collection of qualitative and quantitative data's, analyse market conditions, monitoring of agricultural activities in NGO sector. He is born and brought up in DRC. As the Focal Point of Equateur province and resource person for the REDD+ project, Muna is involved in various activities and processes related to the REDD+ project implementation and successful enhancement of REDD+ project objectives. Muna has served in various cadres in conducting research, monitoring, training, forest inventory and development of research project activities in Equateur including sustainable management of the natural resources and agriculture. He is a trained expert in Natural Resource Management from IUCN, Social communication techniques by ABEF-ND and IPPF, Forest governance & peaceful conflict resolution by IUCN. He has also extensively worked on the implementation of alternative lively hood for rural community including Goat farming, chicken farming and production of quality seeds. Muna is also trained in GIS, soil fertility management and identifying and mitigating the environmental issues. He is proficient in French and Lingala. **JB Bakwikpani: Focal point for Bas-Uele Province** Born and brought up in DRC, Bakwikpani is a graduate in Public law and served as a faculty in the University of Kisangani, DRC. He has successfully completed training in Sustainable Development and youth entrepreneurship organised by the University of Senghor in collaboration with Francophonie Institute for Sustainable Development -IFDD. Jean is also a trainer by profession among youth. He has received training on REDD+ and also delivered trainings on REDD+ in Kinshasa, Kisangani, Goma, Matadi, and other cities of the DRC with FORNAREDD, RNN, RFN, PNUD and OGF Cameroun. He also received training on gender-based violence and community health organised by the USAID, Forest management and sustainable logging from AGEDUFOR, mining and geology from the SIPROCO mining sprl. He has vast experience as a Project coordinator of the renovated REDD+ climate working group in Bas-Uele. As a consultant for sustainable forest management for Chinese company Congo Sanflower forest development. He has served

	as lead in capacity building, land use planning, by the National Coordination of the Renovated REDD Climate Working Group of Bas-Uele. . As a Focal Point of Bas-Uélé province and ressource Person for the whole REDD+ project he is focused on ecological, social and economic aspects of forest resource, sustainable use and participatory resource monitoring. He is having around fifteen years of hands on experience in REDD+ project initiation, implementation and monitoring. He is proficient in French, Lingala and Swahili with average language skills in English. **Mr. Nicolas B Bokese – Focal Point for Maniema province** Nicolas holds Bachelor's and Master's degree in Biology and Nature Conservation Science with specialization in Ecology and Management of Animal Resources. Since last fifteen years of professional experienc he is involved in various works related to nature, forests and REDD+ implementation as an expert and team leader. He is born and brought up in DRC. As the Focal Point of Maniema province and resource person for the whole REDD+ project, Nicolas is involved in various activities and processes related to the REDD+ project implementation and successful enhancement of REDD+ project objectives. Nicolas has served in various cadres in conducting research, monitoring, training, forest inventory and development of research project activities in Sankuru Nature Reserve, Virunga National Park including sustainable management of the natural resources and agriculture. He is a trained expert in REDD+ having obtained various trainings from Conservation International (CI), FAO etc. Involved as a Consultant of Catholic Relief Services-United States Conference of Catholic Bishops (CRS-USCCB) as trainer of trainers in the protection and conservation of nature pertaining to the population living around the protected areas, particularly in case of National Park of the Salonga. On several occasions Nicolas has been lead trainer in forest inventory and monitoring, sustainable development and natural resource conservation organised by the Directorate of Forest Inventories and Development (DIAF) of the Ministry of Environment and Sustainable Development (MEDD). He is proficient in French, Lingala and Swahili with below average language skills in English. **Mr.O.O. Omediheke, Focal point for Sankuru** Omediheke holds a Bachelor degree in Rural Development with specialization in Environment & sustainable development. During the last thirteen years he is involved in natural resource management, rural sustainable development, agricultural product transformation, and welfare

	of women & malnutrition children's. Born and brought up in DRC, he has received training in rural livelihood transformation and agricultural transformations. As the focal point of Sankuru, he is focused on the ecological, social and economic aspects of forest resource, sustainable use and participatory resource monitoring. He has lead served as a lead in capacity building, land use planning, community management, grievance management, socio-economic surveys, biodiversity surveys, and sensitizing the local communities to the objectives of the REDD+ programs. He is an excellent communicator, and has good planning, liaison skills, man power management and local language skills. He has working experience in knowledge building, capacity enhancements, team building, planning relationship management, organization of community trainings and continuous improvement initiatives. He is proficient in French, English, Lingala and Tshiluba languages. In the past, he was instrumental in managing the large scale operations involving multiple experienced professionals. **Omeonga L Shako: Focal point for Tshopo Province** Born and brought up in DRC, Shako is a graduate in law and served as a faculty in the University of Kisangani, DRC. He has successfully completed training courses in REDD+, Monitoring and evaluation of REDD+ Programs. As the Focal Point of Tshopo province and resource person for the whole REDD+ project, he is focused on ecological, social and economic aspects of forest resource, sustainable use and participatory resource monitoring. He has served as lead in capacity building, land use planning, by the National Coordination of the Renovated REDD Climate Working Group (GTCRR). He also served as a consultant for the Renovated REDD Climate Working Group "GTCRR" and provided consultation for the development of livelihood activities for the local and indigenous communities living in and around the Lomami National Park. Shako has obtained professional training on methodologies and survey tools for consultation of communities bordering on protected areas conducted by Rainforest Foundation, UK. He is having around five years of hands on experience in REDD+ project initiation, implementation and monitoring. He is proficient in French, Lingala and Swahili with average language skills in English. **Dr. R. Madhukara, Director –** Projects & Client Engagement – Dr. Madhu is a Doctorate in Environmental Science. He has more than ten years of experience in GHG auditing, consultancy, research and development in

	Environment and climate change related areas. He has participated as Auditor, Lead Auditor, Technical Reviewer in various validation, verification, and certification audits for CDM, VCS, GS, CCB, Plan Vivo, REDD+ and GHG Projects globally for various UNFCCC/VERRA/GS approved auditing agencies. He has undergone extensive training on CDM, VCS, VCS+CCB, GS, Plan Vivo, REDD+ Project development and involved technically in various successful Projects across the World. Madhu is a Lead Auditor for ISO 26000 certified by Professional Evaluation and Certification Board (PECB). He has successfully completed various training courses on carbon monitoring in REDD+, afforestation and reforestation Projects. **Mr. K.T. Rao, Strategy and Finance** – He is Civil Engineer and has nearly 35 years of industry experience. He is experienced in financial domain.

All relevant Project management experience is present in the team of KMS both in DRC and Head quarters, Bengaluru, India. Consultancy and Project development has been a part of our core competence since 2004. We are working as a team since 2004 and formally established this organization in the year 2007. We started our operations on the premise that there is a better and meaningful way to deliver climate protection services to the clients, industry, and society at large. Climate change is a real danger to this planet and it is our collective responsibility to address and work towards climate change mitigation and adaptation.

Our ability to draw upon our long years of proven expertise in consultancy, training and Project development makes us truly unique and we can continuously deliver insights and services.

KMS team has already worked on various REDD+ Projects as a consultant and project developer in Latin America and Africa since last few years. KMS is also having good experience in Aforestation and reforestation CDM/VCS Projects including several program of activities.

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

All relevant Project management and implementation experience is present in the current KMS REDD+ team. Apart from the DRC Head of Operations and his team, each province is looked after by a focal point person for the province. Under the provincial focal point various team members work. Formal worker relationship agreements are signed with various NGO's and will be utilized as necessary.

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

As described earlier in this document until today the internal accruals are spent on this Project development and implementation. KMS is a financially healthy organization with no external debts as on today.

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

As a collaborative effort, the KMS team is committed to upholding a high level of integrity and professionalism throughout all aspects of Project design and implementation. We have a zero tolerance attitude towards corruption and unethical behaviour, and are not involved in, or complicit in, any form of corruption such as bribery, embezzlement, fraud, extortion, and collusion.

2.4.7 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

KMS has relevant practices in place regarding how the commercially sensitive information, archived and made available to the relevant teams/persons only. All mandatory information as per VERRA rules has been made public.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

The project is basically a community REDD+ project planned and developed by Kanaka Management Services Private limited (KMS). KMS has entered into a lease agreement for forest conservation and REDD+ project execution with 218 Chiefs in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema and Sankuru. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC). As per the Constitution of DRC, Chiefs are eligible to sign and enter into REDD+ lease agreement on behalf of the people.

Reference is drawn to the following laws:

1) Organic law n ° 08/016 of October 07, 2008 relating to the composition, organization and functioning of Decentralized Territorial Entities (ETD) and their relations with the State and the Provinces. Constitution provides relevant operational and financial autonomy to ETD which is a Chiefdom/Sector.

2. Decree Law (09 mai 2018- Ministry Arret n° 047/CAB/MIN/ EDD/AAN/MML/05/2018 fixing the homologation procedure on REDD+ investment in the DRCongo) linked to the Official Government Press release (REF: Under the Section Ministry of Environment and Sustainable Development, http://www.leganet.cd/Legislation/JO/2018/jo.01.07.2018.pdf) and

3. The DRC 2011 revised constitution government official press release "CONSTITUTION DE LA REPUBLIQUE DEMOCRATIQUE DU CONGO" (https://www.leganet.cd/Legislation/JO/2011/JOS.05.02.2011.pdf) See law on the ETDs, in DRCONGO). In addition the law No: 11/022 of 24 December 2011 on the fundamental principal of agriculture, onto it article 18 recognized the right to each local community the land rights exercised collectively and individually on its land. All of the land recognized by each local community constitutes its land tenure and includes reserves of land for cultivation, fallow, pasture and rangelands, and the afforestation used regularly by the local community.

As per the DRC government regulations pertaining to REDD+ projects development, the homologation certificates and attestation identification approvals for all the relevant areas were obtained from the National Ministry of Environment and Sustainable Development, in Kinshasa - Gombe.

Following are the details of the Homologation Certificates numbers and attestation identification Certificate numbers followed by the details of all the Chiefs which are part of the project area. Further, National Ministry of Environment and Sustainable Development, Government of DRC has issued a ruling letter on dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer/Investor KMS.

Certificates of Conformity upon validation mission for the valuation of carbon and forest resources in favour of Kanaka Management Services Private Limited for the respective sites in the provinces of Bas-Uele, Equateur, Maniema, Tshopo, Tshuapa, and Sankuru were issued by the National Ministry of Environment and Sustainable Development, Kinshasa.

Conformity Certificate number 007/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Tshuapa and Equateur.

Conformity Certificate number 008/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Sankuru and Maniema.

Conformity Certificate number 009/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Tshopo and Bas-Uele.

The 2008 Decentralization Organic Law complements the 2006 constitution law; it organizes provinces, cities, territorial entities including sectors or Chiefs, and it defines their respective areas of authority and power (Constitution de la Republique Democratique du Congo, 2006).

S.I	Province	Homologation number	Attestation Identification
1	Tshopo	N/Ref:	N0 039/PVRCF/SG-

		002/CAB/MIN/EDD/AAN2018, dt 25 May 2018 N/Ref: 003/CAB/MIN/EDD/AAN2018, dt 25 May 2018 N/Ref: 004/CAB/MIN/EDD/AAN2018, dt 25 May 2018 N/Ref: 005/CAB/MIN/EDD/AAN2018, dt 25 May 2018 N/Ref: 006/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/Ref: 007/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/Ref: 008/CAB/MIN/EDD/AAN/2018, dt 25 May 2018	EDD/2019, dt 30 July 2019 N0 040/PVRCF/SG-EDD/2019, dt 10 July 2019 N0 041/PVRCF/SG-EDD/2019, dt 10 July 2019 N0 042/PVRCF/SG-EDD/2019, dt 10 July 2019 N0 056/PVRCF/SG-EDD/2019, dt 30 July 2019 N0 043/PVRCF/SG-EDD/2019, dt 30 July 2019 N0 044/PVRCF/SG-EDD/2019, dt 30 July 2019
2	Tshuapa	N/REF: 006/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/REF: 008/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/REF: 004/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/REF: 005/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/REF: 009/CAB/MIN/EDD/AAN/2018, dt 25 May 2018 N/REF: 007/CAB/MIN/EDD/AAN/2018, dt 25 May 2018	N0 023/PVRCF/SG-EDD/2019, dt 08 Oct 2019 N0 025/PVRCF/SG-EDD/2019, dt 08 Oct 2019 N0 021/PVRCF/SG-EDD/2019, dt 08 Oct 2019 N0 022/PVRCF/SG-EDD/2019, dt 08 Oct 2019 N0 026/PVRCF/SG-EDD/2019, dt 08 Oct 2019 N0 024/PVRCF/SG-EDD/2019, dt 08 Oct 2019
3	Sankuru	N/Ref: 009/CAB/MIN/EDD/AAN2018,	N0 045/PVRCF/SG-EDD/2019, dt 30 May 2019

		dt 25 May 2018	
4	Equateur	N/Ref: 012/CAB/MIN/EDD/AAN2018 dt 25 May 2018	N0 021/PVRCF/SG-EDD/2019, dt 29 Nov 2019
5	Bas-Uele	N/Ref: 013/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 014/CAB/MIN/EDD/AAN2018 dt 18 June 2018 N/Ref: 015/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 016/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 017/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 021/CAB/MIN/EDD/AAN/2018 dt 18 June 2018	N 0007/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N 0019/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N 0001/PVRPF/SG-EDD/2019 dt 30 Apr 2019 N 0002/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N 999/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N 0004/PVRCF/SG-EDD/2019 dt 30 Apr 2019
6	Maniema	N/Ref: 020/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 021/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 020/CAB/MIN/EDD/AAN/2018 dt 28 May 2018 N/Ref: 023/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 024/CAB/MIN/EDD/AAN/2018 dt 18 June 2018 N/Ref: 025/CAB/MIN/EDD/AAN/2018 dt 18 June 2018	N 018/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N0011/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N0017/PVRCF/SG-EDD/2019 dt 20 Apr 2019 N0016/PVRCF/SG-EDD/2019 dt 30 Apr 2019 N0014/PVRCF/SG-EDD/2019 30 Apr 2019 N0015/PVRCF/SG-EDD/2019 dt 30 Apr 2019

Table #4 – Details of the homologation and attestation certificates.

Sl. No	Province	Territory	Chief/Area
1	Tshopo	Banalia	Baboro
2			Bamanga
3			Banalia Bangba
4			Popoy
5			Baboa De Kole
6		Bafwasenda	Bemili
7			Bafwandaka
8			Bekeni-Kondolole
9			Bakumu D'Angumu
10			Barumbi-Opienge
11			Bakundumu
12		Ubundu	Walengola Babira
13			Mituku-Bamoya
14			Mituku-Basikate
15			Walengola-Lowa
16			Walengola-Lilo
17			Bakumu D'Obiatuku
18			Bakumu Kilinga
19			Bakumu Mangongo
20			Bakumu Mandombe
21			Walengola Baleka
22		Opala	Yalingo
23			Balinga-Lindja
24			Yawende Lolo
25			Tooli
26			Lobaie
27			Yeyango
28			Yapandu
29			Mongo

30			Kembe
31			IYE
32		Basoko	Wahanga
33			Yaliwasa
34			Yamandundu
35			Itimbiri
36		Yahuma	Bosoku
37			Bolinga
38			Buma
39			Mombesa
40		Isangi	Lueta
41			Liutua
42			Kombe
43			Yalihila
44			Turumbu
45			Bolomboki
46			Yalikoko-Mboso
47			Yalikandja-Yanongo
48	Sankuru	Lodja	Ahamba-Mange
49			Vungi
50			Lutshimba
51			Watambulu
52			Nambelu-Luhembe
53			Kondo-Tshumbe
54			Lukfungu
55			Olemba
56			Batetela lukenie
57		Kole	Atshuru
58			Bankutshu-Lukenie
59			Ohindo
60			Basho
61			Bankutshu-Dibele

62			Batetela
63		Lomela	Bahamba II
64			Bahamba I
65			Batetela-Lomela
66			Bakela
67			Djonga
68			Okutu
69		Lusambo	Batetela
70			Basonge
71			Piana Mutombo
72			Entre Kunduye Mal
73			Kashindi
74			Lubi
75			ELK
76			Sankuru
77		Katako-Kombe	Wantambulu Nord
78			Ngandu
79			Wantambulu Sud
80			Lukumbe
81			Ukulungu
82			Djalo
83			Lonya
84			Basambala
85			Arabisee Batetela Lomami
86		Lubefu	Modja-Ngando
87			Basongo
88			Ndjovu
89			Ngandu Wuma
90	Tshuapa	Djolu	Yala
91			Djolu
92			Lingomo
93			Luo

94		Ikela	Tumbenga
95			Lofome
96			Loile
97			Lokina
98			Tshuapa
99		Befale	Lomako
100			Duale
101			Befumbo
102		Boende	Lofoy
103			Djera
104			Wina
105			Bolua
106		Monkoto	Monkoto
107			Bianga
108			Nongo
109		Bokungu	Luay
110			Loombo
111			Nkolo
112			Luando
113			Lolaka
114	Equateur	Bomongo	Bomongo
115			Ngiri
116		Lukolela	Lusakani
117			Mpama
118			Banunu
119		Bikoro	Elanga
120			Lac Ntomba
121			Ekonda
122		Ingende	Bokatola
123			Duali
124			Eungu
125		Bolomba	Mampoko

126			Bolomba
127			Dianga
128			Lusanganya
129			Busira
130		Basankusu	Basankusu
131			Gombalo
132			Waka-Bokeka
133		Makanza	Mweko
134			Bangala
135			Ndobo
136	Bas-Uele	Aketi	Mongwandi
137			Avuru-Duma
138			Avuru-Gatanga
139			Mobati-Boyele
140			Gbandi
141			Bodongola
142			Mabinza
143			Yoko
144		Ango	Mopoy
145			Sasa
146			Ngindo
147			Ezo
148		Bambesa	Makere II
149			Bolungwa
150			Bakete
151			Bokiba
152			Mange
153			Mondwangali
154			Bokapo
155			Bakere Bakete
156			Makere I
157		Bondo	Soa

158			Kasa
159			Deni
160			Gaya
161			Goa
162			Duaru
163			Mobenge Mondila
164			Biamange
165			Gama
166			Boso
167		Buta	Bayeu-Bogbama
168			Bayeu-Bogongia
169			Basiri-Mongingita
170			Monganzolo
171			Nguru
172			Mobati
173		Poko	Kembisa
174			Abarambo
175			Ngbaradi
176			Madi
177			Soronga
178			Mabanga
179			Babena
180			Zune
181			Kipate
182			Bakangaafa
183			Malele
184			Gamu
185			Komendeni
186	Maniema	Kasongo	Wazinmba-Maringa
187			Nonda
188			Wazimba wa Mulu
189			Benia-Samba

190			Basonge 1
191			Basonge 2
192			Wazula
193			Mamba-Kasenga
194			Bakwange
195		Kibombo	Bahina
196			Aluba
197			Matapa
198			Bakongola
199			Ankutshu
200		Kailo	Bangengele
201			Balanga
202			Wasongola
203			Ambwe
204		Lubutu	Obokote
205			Bitule
206		Pangi	Wakabango
207			Beia
208			Ikama
209			Babene
210		Punia	Baleka
211			Ulindi
212			Babira Bakwame
213		Kabambare	Babuyu
214			Kabambare
215			Sarambila
216			Lulindi
217			Bahemba
218			Wamaza

Table #5 – Details of the Chiefs / Sectors in the project area.

Certificates of Conformity upon validation mission for the valuation of carbon and forest resources in favor of Kanaka Management Services Private Limited for the respective sites in the provinces of Bas-Uele, Equateur, Maniema, Tshopo, Tshuapa, and Sankuru were issued by the National Ministry of Environment and Sustainable Development, Kinshasa.

Conformity Certificate number 007/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Tshuapa and Equateur.

Conformity Certificate number 008/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Sankuru and Maniema.

Conformity Certificate number 009/08/020/PVRCF/DG/DC/EDD/2020 dated 1st September 2020, for the provinces of Tshopo and Bas-Uele.

The following are the CN REDD certificates issued by the Government of DRC.

Numero d'enregistrement as per CN REDD Certificate	Homologation Certificate number/s	Area/s mentioned on CN REDD certificate	Hectares shown on the CN REDD Certificate
002	012/CAB/MIN/EDD/AAN2018, du 25 May 2018	Province: Equteur Territories: Bomongo, Lukolela, Bikoro Ingende, Bolomba, Basankusu Makanza	8429142
003	010/CAB/MIN/EDD/AAN2018, du 25 May 2018	Province: Sankuru Territories: LODJA, KOLE, LOMELA LUSAMBO, KATAKO-KOMBE, LUBEFU	9900903
0004	013/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Pronvince: Bas-Uele Terrriroty:	2069856

		Aketi	
0005	014/CAB/MIN/EDD/AAN2018 du 18 Juin 2018	Province: Bas-Uele Ango	3469748
0006	015/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Bas-Uele Bambesa	979435
0007	016/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Bas-Uele Territories: Bondo	1880632
0008	017/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Bas-Uele Territories: Buta	1778175
009	018/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Bas-uele Territoy: Poko	2317783
0010	018/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Maniema Territory: Lubutu	1082399
0011	024/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Maniema Territory: Pangi	1873778
0012	025/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Maniema Territory: Punia	1483610
0013	002/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018	Pronvince: Tshopo Territory: Banalia	1749365
0014	003/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018	Province: Tshopo Territory: Bafwasende	3360021

015	009/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018 011/CAB/MIN/EDD/AAN/2018 25 Mai 2018	Province: Tshuapa Territory: Monkoto	1721406
016	004/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018 006/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018 008/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018	Province: Tshuapa Territory: Befale, Djolu and Ikela	5067056
017	005/CAB/MIN/EDD/AAN/2018 du 25 mai 2018 007/CAB/MIN/EDD/AAN/2018 du 25 mai 2018	Province: Thsuapa Boende and Bokungu	3362836
018	020/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Maniema Kasongo, Kibombo and Kailo	9680360
019	004/CAB/MIN/EDD/AAN/2018 du 25 May 2018 005/CAB/MIN/EDD/AAN/2018 du 25 May 2018 007/CAB/MIN/EDD/AAN/2018 du 25 May 2018	Province: Tshopo Ubundu, Opala and Basoko	7507647
020	008/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018 006/CAB/MIN/EDD/AAN/2018 du 25 Mai 2018	Province: Tshopo Territory: Yahuma and Isangi	2344512
0021	019/CAB/MIN/EDD/AAN/2018 du 18 Juin 2018	Province: Maniema Territory:	1952287

		Kabambare	

Environmental approval certificate reference N0/Ref.AQ/UACE/CM/JCEE/DIE/2021 dated 29-March-2021issued by Congolese Environment Agency, Government of DRC.

As a matter of public information and process, the respective KMS REDD+ project areas may be displayed on the National Forest Monitoring System of DRC website http://www.rdc-snsf.org/.

2.5.2 Recognition of Property Rights (G5.1)

The 2008 Decentralization Organic Law complements the 2006 constitution law; it organizes provinces, cities, territorial entities including sectors or Chiefs, and it defines their respective areas of authority and power (Constitution de la Republique Democratique du Congo, 2006). This project is basically a community REDD+ project planned and developed by Kanaka Management Services Private limited (KMS). KMS has entered into a lease agreement for forest conservation and REDD+ project execution with 218 Chiefs in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema and Sankuru. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC). As per the Constitution of DRC, Chiefs are eligible to sign and enter into REDD+ lease agreement on behalf of the people. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC).

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

During initial stages, the KMS teams had exhaustive analysis and review meetings at all Chiefdom’s levels, with all relevant stakeholders and the community members during November – December 2016. At territory level meetings for all Chiefs in the territory were conducted during November – December 2016. Further annual reviews are conducted in all Project Chief areas. The Project will not encroach uninvited private property, force anybody, community property or Government property or any other lands.

2.5.4 Property Rights Protection (G5.3)

Due to this REDD+ Project activity there are absolutely no evictions or land grabbing in the Project area or surrounding areas. In fact the Project land belongs to the communities itself who continue to live where they were before and hence Project is a fully participating community based REDD+ Project.

2.5.5 Illegal Activity Identification (G5.4)

The Project teams will monitor on a regular basis, report, and remove all the illegal activities in the Project zone through relevant procedures. Right holders are very much in same places as they were before the start of the REDD+ project implementation.

2.5.6 Ongoing Disputes (G5.5)

There are no on-going conflicts or disputes in the Project area between the communities and the proponents. There have additionally been no conflicts or disputes over the land, territory, or resources in the Project Area.

2.5.7 National and Local Laws (G5.6)

The project is basically a community REDD+ project planned and developed by Kanaka Management Services (KMS). KMS has entered into a lease agreement for forest conservation and REDD+ project execution with 218 Chiefs in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema and Sankuru. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC). As per the Constitution of DRC, Chiefs are eligible to sign and enter into REDD+ lease agreement on behalf of the people.

Reference is drawn to the following laws:

1) Organic law n ° 08/016 of October 07, 2008 relating to the composition, organization and functioning of Decentralized Territorial Entities (ETD) and their relations with the State and the Provinces. Constitution provides relevant operational and financial autonomy to ETD which is a Chiefdom/Sector.

2. Decree Law (09 mai 2018- Ministry Arret n° 047/CAB/MIN/ EDD/AAN/MML/05/2018 fixing the homologation procedure on REDD+ investment in the DRCongo) linked to the Official Government Press release (REF: Under the Section Ministry of Environment and Sustainable Development, http://www.leganet.cd/Legislation/JO/2018/jo.01.07.2018.pdf) and

3. The DRC 2011 revised constitution government official press release "CONSTITUTION DE LA REPUBLIQUE DEMOCRATIQUE DU CONGO" (https://www.leganet.cd/Legislation/JO/2011/JOS.05.02.2011.pdf) See law on the ETDs, in DRCONGO). In addition the law No: 11/022 of 24 December 2011 on the fundamental principal of agriculture, onto it article 18 recognized the right to each local community the land rights exercised collectively and individually on its land. All of the land recognized by each local community constitutes its land tenure and includes reserves of land for cultivation, fallow, pasture and rangelands, and the afforestation used regularly by the local community.

As per the DRC government regulations pertaining to REDD+ projects development, the homologation certificates and attestation identification approvals for all the relevant areas were obtained from the national Ministry of Environment and Sustainable Development, in Kinshasa - Gombe.

Following are the details of the Homologation number and attestation identification followed by the details of the Chiefs which are part of the project area.

Further, National Ministry of Environment and Sustainable Development, Government of DRC has issued a ruling letter on dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer investor KMS.

2.5.8 Approvals (G5.7)

The project is basically a community REDD+ project planned and developed by Kanaka Management Services Private limited (KMS). KMS has entered into a lease agreement for forest conservation and REDD+ project execution with 218 Chiefs in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema and Sankuru. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC). The lease agreement clearly defines the roles and responsibilities of KMS and the land owners. The project is basically a community REDD+ project planned and developed by Kanaka Management Services Private limited (KMS). KMS has entered into a lease agreement for forest conservation and REDD+ project execution with 218 Chiefs in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema and Sankuru. All lease agreements are signed by respective Chief on behalf of the people after extensive discussions between all stake holders and communities. The forest land lease agreement is based on “Free Prior and Informed Consent” (FPIC). As per the Constitution of DRC, Chiefs are eligible to sign and enter into REDD+ lease agreement on behalf of the people.

Reference is drawn to the following laws:

1) Organic law n ° 08/016 of October 07, 2008 relating to the composition, organization and functioning of Decentralized Territorial Entities (ETD) and their relations with the State and the Provinces. Constitution provides relevant operational and financial autonomy to ETD which is a Chiefdom/Sector.

2. Decree Law (09 mai 2018- Ministry Arret n° 047/CAB/MIN/ EDD/AAN/MML/05/2018 fixing the homologation procedure on REDD+ investment in the DRCongo) linked to the Official Government Press release (REF: Under the Section Ministry of Environment and Sustainable Development, http://www.leganet.cd/Legislation/JO/2018/jo.01.07.2018.pdf) and

3. The DRC 2011 revised constitution government official press release "CONSTITUTION DE LA REPUBLIQUE DEMOCRATIQUE DU CONGO" (https://www.leganet.cd/Legislation/JO/2011/JOS.05.02.2011.pdf) See law on the ETDs, in DRCONGO). In addition the law No: 11/022 of 24 December 2011 on the fundamental principal of agriculture, onto it article 18 recognized the right to each local community the land rights exercised collectively and individually on its land. All of the land recognized by each local community constitutes its land tenure and includes reserves of land for cultivation, fallow, pasture and rangelands, and the afforestation used regularly by the local community.
As per the DRC government regulations pertaining to REDD+ projects development, the homologation certificates and attestation identification approvals for all the relevant areas were

obtained from the national Ministry of Environment and Sustainable Development, in Kinshasa - Gombe.

Following are the details of the Homologation Certificates number and attestation identification Certificate Numbers followed by the details of the Chiefs which are part of the project area.
Further, National Ministry of Environment and Sustainable Development, Government of DRC has issued a ruling letter on dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer/Investor KMS.

2.5.9 Project Ownership (G5.8)

The Project qualifies under the ownership requirements of VCS Standard VM0015 that generates GHG emission reductions and/or removals (where the Project proponent has not been divested of such Project ownership). The Project is basically community REDD+ Project planned and developed by KMS. KMS has entered into a lease agreement for forest conservation and REDD+ Project execution with 212 chiefdoms in the six provinces namely Tshopo, Tshuapa, Equateur, Bas-Uele, Maniema, and Sankuru. All lease agreements are signed by respective Chief on the behalf of the people after extensive discussion between all stake holders and communities. The forest land lease agreement is based on “Free prior and informal consent” (FPIC). The lease agreement clearly defines the roles and responsibilities of KMS and the land owners. Further, National Ministry of Environment and Sustainable Development, Government of DRC has issued a ruling letter on dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer/Investor KMS. After through harmonization, Office of the National Coordinator of REDD+ Project, Kinsahasa has issued the “Attestation D’ Entegistrement” from 1st January 2017 to 31st December 2116. Basankusu, Bikoro, Bolomba, Bomongo, Ingende, Lukolela and Makanza territories in Equateur Province for area 8429142 ha, Ango territory, Bas-Uele Province for area 3469748 ha, Makere Equateur for 8429142 Ha, Bolungwa, Bakete, Bokiba, Mango, Mondongwale, Bokapo, Makere Bakete, & Makere 1 territories for 979434 Ha, Bayeu-Bogbama, Bayeu-Bongongia, Basiri-Mongingta, Monganzolo, Nguru & Mobati for 1778175 Ha, Kembisa, Abarambo, Ngbaradi, Madi, Soronga, Mabanga, Babena, Zune, Kipate, Bakangale-Avuru, Malele, Gamu and Komendeni for 2317783 Ha, Obokote & Bitule for 1082399 Ha, Wakabonga, Beia, Ikama & Babene territories for 1873778 Ha, Punia territory in Maniema for 1483610 Ha, Bemili, Bafwandaka, Bekeni-Kondolole, Bakum d’Angumu, Barumbi Opienge & Bankundumu for 3360021 Ha, Bianga, Nongo & Monkoto for 1721406 Ha, Boende & Bokungu for 3362836 Ha, Kasongo, Kibombo & Kailo for 9680360 Ha and Yahuma & Isangi for 1125270 Ha.

2.5.10 Management of Double Counting Risk (G5.9)

The carbon credits generated from the Project will be registered under the Verified Carbon Standard and sold under VERRA mechanism. Credits from the Project will not be registered or sold under any regulatory scheme. As and when the credits become eligible under any regulatory scheme, the proper actions will be taken to ensure that credits are not sold twice. Further, this is basically a community based REDD+ Project.

2.5.11 Emissions Trading Programs and Other Binding Limits

The KMS REDD+ Project has not and does not intend to generate any related environmental credit for GHG emissions reductions or removals other than those claimed under the VCS Program. As mentioned in Section 3.4 KMS will pursue project validation and verification under the CCB Standard. No other forms of environmental credit will be sought by the project proponent.

2.5.12 Other Forms of Environmental Credit

The National REDD+ Project has not sought or received any form of GHG-related environmental credits under any programs/projects.

2.5.13 Participation under Other GHG Programs

This project has not been seeking registration under any other GHG programs other than VCS and CCB. CCB verification will demonstrate positive climate community and biodiversity impacts but does not produce any registered emissions reductions or credits.

2.5.14 Projects Rejected by Other GHG Programs

The National REDD+ Project has not been submitted and/or rejected by any GHG program.

2.5.15 Double Counting (G5.9)

The carbon credits generated from the Project will be registered under the Verified Carbon Standard and sold under VERRA mechanism. Credits from the Project will not be registered or sold under any regulatory scheme. As and when the credits become eligible under any regulatory scheme, the proper actions will be taken to ensure that credits are not sold twice. Further, this is basically a community based REDD+ Project.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

The project complies with all rules and requirements stated in the following documents:

- Verified Carbon Standard (VCS) Program guide Version 4.0, 19 September 2019
- VCS Standard, Version 4.0
- VCS Methodology Requirements, v4.0, 19 September 2019
- VM0015 Methodology for Avoided Unplanned Deforestation, v1.1
- AFOLU Non-Permanence Risk Tool, v4.0

- VT0001 Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities.

3.1.2 Applicability of Methodology

In PAA the following conditions apply.

1) The Baseline activities include unplanned logging for timber fuel-wood collection charcoal production and agricultural.

2) Project activities may include one or a combination of the eligible categories defined in VM0015.

3) The project area can include different types of forest such as but not limited to old-growth forest degraded forest secondary forests planted forests and agro-forestry systems meeting the definition of “forest”.

4) At project commencement, the project area shall include only land qualifying as “forest” for a minimum of 10 years prior to the project start date.

Methodology/Applicability	Current state of affairs
Assessment of the Land cover in the project area consists of either one contiguous area or multiple discrete project parcels (see definition of project area) and must meet an internationally accepted definition of forest such as those based on UNFCCC host-country thresholds or FAO definitions and must qualify as forest for a minimum of 10 years before the project start date.”	The Project proponents has analyzed the current state of the land cover conditions in the project area through remote sensing experts using remote acquired datasets such as Landsat and Sentinel missions at the start of the project covering the span of 15 years as suggested by the VM0015 to assess the extent of forest cover. The national REDD+ project in the Democratic Republic of Congo qualifies the conditions suggested by VM0015 and those based on UNFCCC host country thresholds. The project area is comprised of intact old-growth forests covering 90% of the project area over hundreds of years. The project area meet the criteria of UNFCC i.e. minimum forest area (0.05 to 1 ha) the potential to reach a minimum height at maturity in situ (2 to 5 m) and the minimum tree crown cover 10 to 30 % The forests are classified as Dense moist forest Shrub land Grassland and moist swamp forest with canopy cover >10%.
Baseline activities may include planned or unplanned logging for timber fuel-wood collection and charcoal production agricultural and grazing activities as long as the category is unplanned	The KMS REDD+ Project team has analyzed the project conditions through field surveys has evaluated and identified the ground level activities of the various communities in all the provinces. The team identified that illegal logging for timber fuelwood charcoal production unsustainable agricultural activities such as slash and burn agriculture

deforestation according to the most recent VCS AFOLU requirements.	grazing activities and urbanization are the chief causes of the deforestation and degradation in the project area.
Project activities may include one or a combination of the eligible categories defined in the description of the scope of the methodology	The KMS REDD+ team has analyzed the project conditions through field surveys has evaluated and identified the ground level activities of the various communities in all the provinces. The proposed activity by the KMS REDD+ team is “Avoiding deforestation and degradation without and with logging in the project case.
The project area must be deforested or degraded in the absence of the REDD project activity and the deforestation and degradation must be mosaic or frontier in nature as described in the VCS AFOLU.	During the initial survey KMS REDD+ team has identified and analyzed various activities resulting in conversion of forest land by various activities viz. conversion of forest land to cropland for subsistence farming Conversion of forest land to settlements Conversion of forest land to infrastructure including new roads Logging of timber for commercial sale (e.g. wood planks or poles for commercial sale) Logging of timber for local enterprises and domestic uses Wood collection for commercial sale of fuelwood and charcoal Fuelwood collection for domestic and local industrial energy needs (eg cooking home heating tobacco curing brick making) Cattle grazing in forests Extraction of understory vegetation (eg thatch grass collection for roof and livestock bedding materials shrubs and small trees for straw fences); Forest fires to the extent that they are not part of natural ecosystem dynamics (eg forest fires related to hunting honey collection intentional land clearing on land with a high fuel-load) illegal artisanal mining and construction of logging roads and commodity-based urbanization.
Historical land-use and land-cover change in the reference region going back about 10-15 years from present.	Historical land-use and land cover change were mapped using remotely sensed data (ex: Landsat) in the GEE platform in accordance with the methodology suggested in VM0015 at an interval of 5 year period.
Ex-ante estimation of actual carbon stock changes and non-CO2 emissions under the project scenario.	The actual carbon stock changes and/or emissions were estimated based on the methods described in VM0015.

Table #8: Methodology applicability and current state of affairs.

3.1.3 Project Boundary

Carbon dioxide (CO2) was determined to be the primary source of greenhouse gas emissions in the due to converstion of forest land to non-forest land in the Project Area. The key activities mobilizing the conversion and listed in the baseline scenario. The emissions arising out of other which involves other gases such as Methane (CH4) and nitrous oxide (N2O) are conservatively are omitted from the project.

Source		Gas	Included?	Justification/Explanation
Baseline	Slash & burn agriculture	CO_2	Yes	Major Pool considered in the baseline scenario.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.
	Logging	CO_2	Yes	Major Pool considered in the baseline scenario.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.
Project	Slash & burn agriculture	CO_2	Yes	Major Pool considered in the baseline scenario.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.
	Logging	CO_2	Yes	Major Pool considered in the baseline scenario.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.

Table #9: Methodology applicability and current state of affairs.

Figure #7 – The delineated spatial boundary "National REDD+ project in the Democratic Republic of Congo"

3.1.4 Baseline Scenario

The VCS Methodology for avoiding unplanned deforestation (AUD VM0015) is a step-wise approach for selecting the plausible baseline scenario. The project area was determined to be the continuation of pre-project land use activity such as slash & burn activity small scale illegal logging along with small scale encroachment artisanal mining and commodity-based urbanization. The surrounding areas including additional protected areas have seen significant levels of ecosystem conversion from forest to agriculture and urban land demonstrating that commodity-based urbanization and slash & burn agriculture is the major driver for unplanned ecosystem conversion in this region and it is also the most obvious scenario that would occur in the absence of a REDD+ project. The summary of the baseline estimation and GHG emissions were quantified as per the below steps:

1. Definition of the forest cover classes:

The project area includes different types of forest, such as, primary forests, swamp forests and savannah forests, old-growth forest, degraded forest, secondary forests, planted forests and agro-forestry systems meeting the definition of "forest" as stated by the IPCC. The natural classes identified were reclassified or stratified into two classes' viz., Primary forests, swamp forests & savannah to dense forest, and Secondary & Savannah forests to sparse forests (figure #8, table #6). The satellite images of 2017 were used to generate the land-use and land-cover map at the project start date shown in Figure 8, which meets methodology requirements stated in the VM0015 at the project start date.

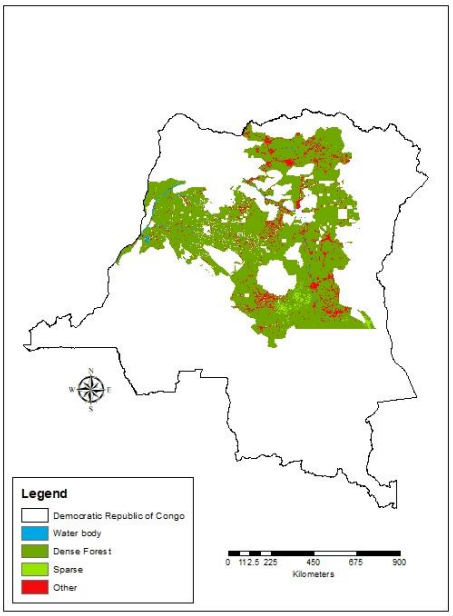

Figure 8: The land cover map of the National REDD+ Project in the Democratic Republic of Congo at project start.

ID	Land cover type	Reclassified class	Regions	Trend in Carbon Stock	Baseline Activity		Description
					LG	AG	
1	Primary forests	Dense Forest	RR, PA, & LB	Decreasing	Yes	Yes	According to Official classification of the types of vegetation in DRC in 2017
2	Swamp Forests			Decreasing	Yes	Yes	
3	Savannah			Decreasing	Yes	Yes	
4	Secondary Forests	Sparse Forest		Decreasing	Yes	Yes	
5	Savannah Forests			Decreasing	Yes	Yes	

Table 6: Identification and baseline activity of all LU/LC classes at project start date within the reference region (RR), project area (PA), and leakage belt (LB).

2. Quantification of Land Use land cover changes in the Project area, Reference Region and Leakage Belt.

2.1 Delineating the Spatial Boundaries: The spatial boundaries such as Reference region, Project area, Leakage belt, Leakage management areas and forest were defined as per the section 1.1.1 to 1.1.5 in VM0015. According to this analysis the Project area was estimated to be 72010950 hectares and reference region is 2.5-3 times more than the Project area (Brown et al., 2007).

2.2 Land use Land Cover change modeling: The land use land cover change modeling was performed for historical reference period (2001-2016) and thereafter every year until the current monitoring period using the remote sensing data and the ground truth data. The carbon pools assessed were AGB, BGB, SOC, Dead Wood and Litter. Harvested wood products were excluded as there was no significant contribution. The accuracy of the land cover maps were assessed using both Kappa index and visual inspection i.e., super imposed over the Google Earth Maps. The overall accuracy achieved was over 90% as stated in methodology section 2.5. The entire analysis was carried out in the Google Earth Engine Platform. The Random Forest classifier was used to carry out supervised classification. As per the methodology

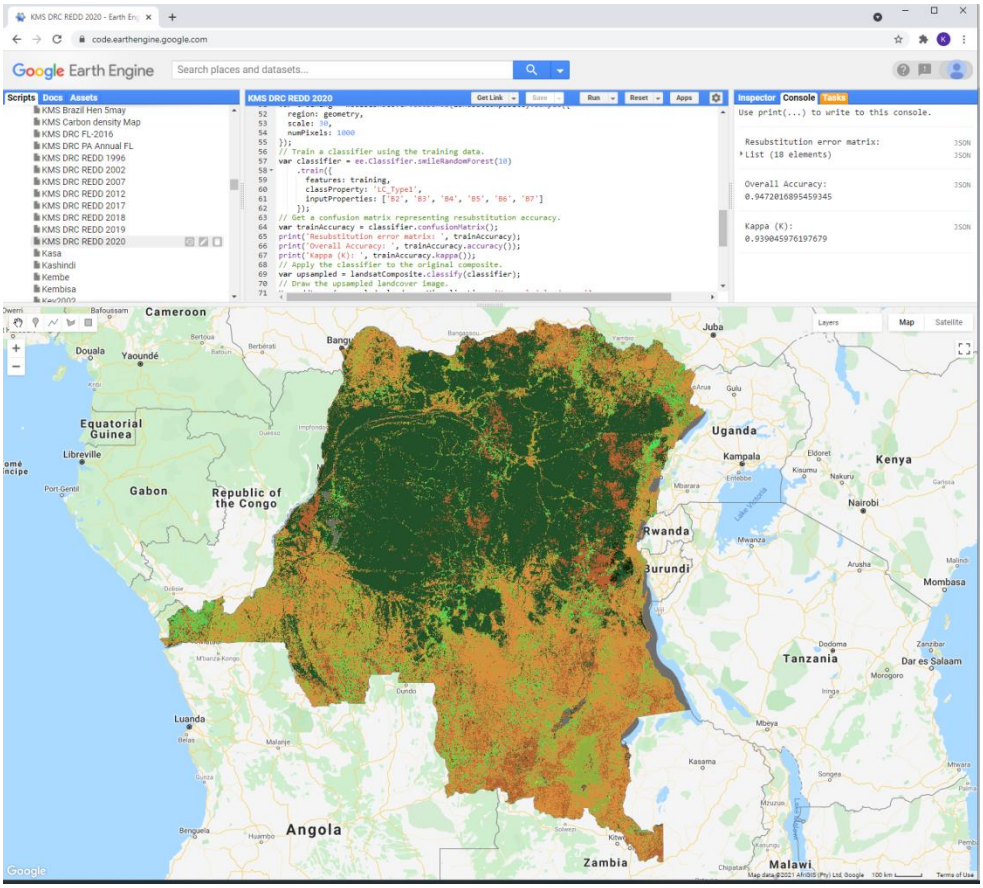

Figure 9: The land cover map of the National REDD+ Project in the Democratic Republic of Congo for the year 2020 with Kappa accuracy.

Identify and analyze the deforestation agents: In the next step, the identification and analysis of the deforestation agents was carried out with likely future development through literature review, field visits, hybrid Google earth maps and expert consultations. During this step, the agents identified were farmers, ranchers, and loggers.

Deforestation Projection: The projection of future deforestation was carried out based using modeling approach as per the section 4.0 in VM0015 methodology. The location of the future deforestation was too mapped using the MCE & Empirical approach. As per the analysis the deforestation in the project was best assumed to be 85-95% of the forested area would be deforested in the case of the absence of the Project.

Baseline carbon stock changes: The baseline carbon stock changes was estimated involving two steps: a). average carbon stock of each LU/LC class was estimated as per the section 6 in VM0015 methodology and b). Carbon stock changes in the region as per the method 2. The average carbon stock was estimated using the Harmonized Carbon density maps obtained from the Google earth engine (Spawn et all 2010). The total carbon stock in the project was found to be 997.4 t/ha and 849.20 t/ha in sparse forest this is inclusive of all the pools assessed.

For detailed step-by-step analysis please refer to section #4. (Quantification of GHG emission reductions) in this document.

3.1.5 Additionality

Simple cost investment analysis is used to demonstrate the additionality. Since the project areas are the community forest lands and no any external support or investment is received, the project is found to be additional.

3.1.6 Methodology Deviations

There are no deviations to the methodology in this project.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

1. Defining Spatial and temporal boundaries (Part 2, Step 1 of VM0015):
1.1 Spatial Boundaries:

The spatial delineation of the project spatial boundaries was carried out as described in the section 1.1 – 1.4 of VM0015 methods. The project boundaries were processed using standard GIS software after obtaining the administrative boundaries from the open source database (https:// gadm.org). The reference regions were delineated. The information such as rates, agents, drivers and patterns of land-use and land-cover were obtained from this region and projected into the future and monitored. The leakage belt was delineated using the option #2. i.e., Mobility Analysis – The mobility analysis was chosen due to the fact that Option#1 was time consuming and not available during the times and secondly, the deforested areas in the reference region were less than 80%The steps adopted were multi-criteria evaluation (MCE). To identify the regions of leakage the entire area were divided into 1km by 1km grid and assigned a weightage based on the human influence in these regions. The datasets used to calculate the weights were Roads with 500m buffered with an assumption that disturbance will be high in the first 500m from the road, settlements with 500m buffer and the presence of forest area. The weights assigned were 10 for all the grids falling on those areas within the 500m buffer and “0” in other areas around both settlements and roads. Similarly, the weight of 10 was assigned were the grids did not had forest cover. Finally, the leakage management areas were delineated using the GIS software to identify the areas to implement activities to avoid deforestation.

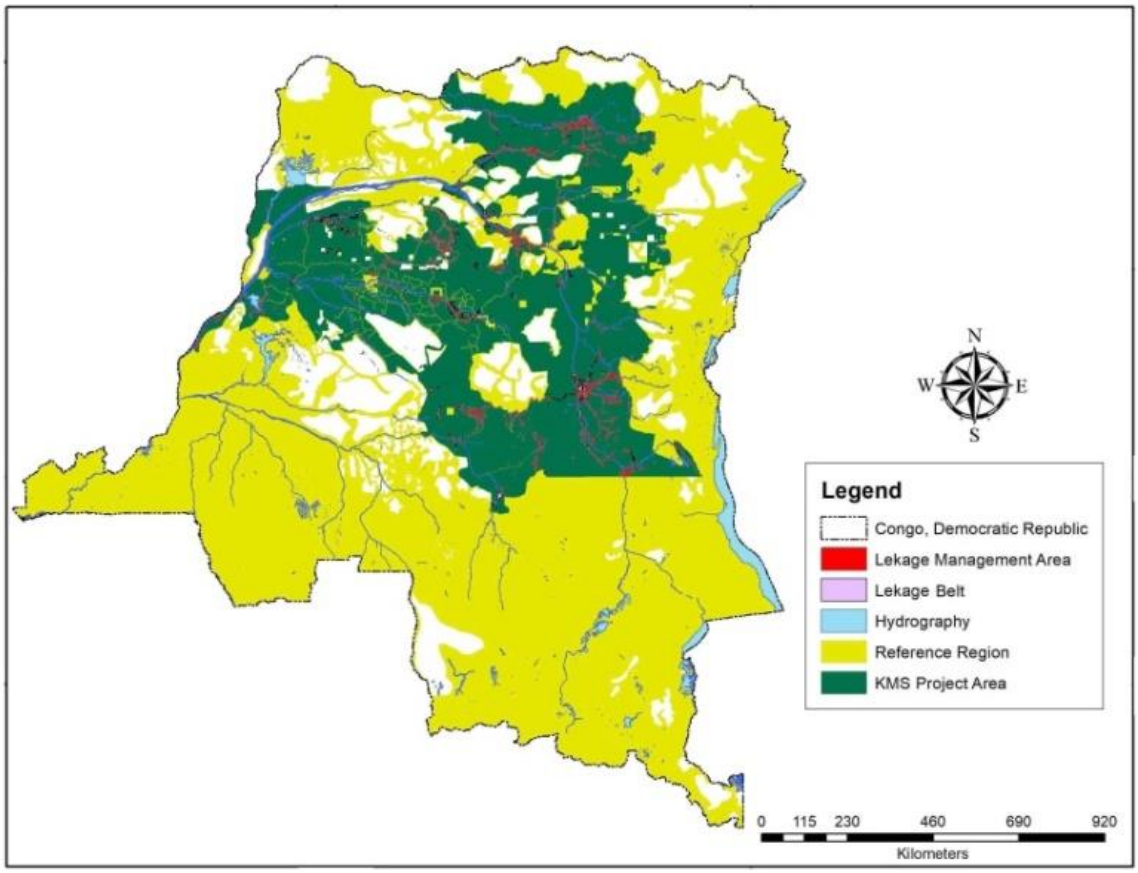

Figure 10: Map showing the delineated areas in the Democratic Republic of Congo

1.2 Temporal boundaries:

The temporal boundaries such as Historical reference period, Start date of Project crediting period, Start date of the project crediting period, Start date and end date of the first fixed baseline period, and Monitoring Period. The start date of the project crediting period was decided based on the commencement of the activities i.e., patrolling, the historic reference period was selected based on the project start date.

1.3 Carbon Pools:

The following are the carbon pools identified for monitoring and Reporting. These pools were selected as these are expected to decrease in carbon stock in the case of absence of the Project.

Carbon Pools	Included/Excluded	Justification
Above-ground	Included	Significant Resource
Below-ground	Included	Significant Resource
Dead Wood	Included	Significant Resource
Harvested Wood Products	Excluded	Non-significant Resource
Litter	Included	Significant Resource
Soil Organic Carbon	Included	Significant Resource

Table #7: Carbon pools monitored in this project.

Information related to step 2 which is the analysis of historical land-use and land-cover change in the reference region going back about 10-15 years from present and step 3 related to the analysis of agents, drivers and underlying causes of deforestation, and sequencing of the typical chain of events leading to land-use and land-cover change is described as below:

2. **Historical Land use land cover change modeling (Step #2 of VM0015).**
The quantification of land use and land cover change modeling future deforestation. For the projection of future deforestation in the baseline scenario approach "C" of the VM0015 methodology was selected given that the rate of baseline deforestation is assumed to be a continuation of the average annual rate measured during the historical reference period (2001-2016) within the Reference region. In addition, the advantage of using model based and/or derived baselines is their ability to display non-linear factors of deforestation (Huettner 2009).

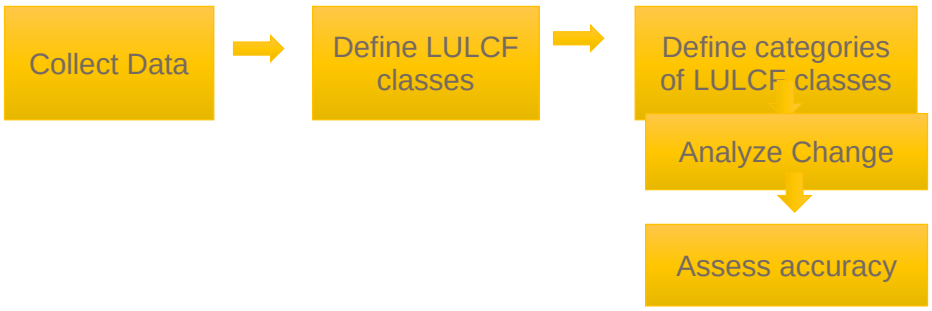

Figure #11: Steps adopted in LULC Modeling

2.1 – Data Collection: The Remotely Sensed data i.e., Landsat [Landsat 8 Operational Land Imager (OLI)/Thermal Infrared Sensor (TIRS), Landsat 7 Enhanced Thematic Mapper Plus (ETM+)] having 30m resolution was selected with three time points five years apart. A composite was built over the Reference region. To reduce the complexity, the entire area was classified into Dense and Sparse Forest and the ground truth data was collected using stratified random sampling points. Each of these point datasets was used to classify the Landsat data. The years analyzed were 2001, 2006, 2011, 2016 and thereafter every year.

All the classified images were assessed for quality as suggested in VM0015. The classified image had overall accuracy greater than 90% and the minimum classification accuracy for each class was 80%. The Kappa coefficient was used to measure the accuracy. The accuracy was assessed only at the most recent date, for which ground-truthing data that was collected (Vázquez-Quintero, 2016).

Satellite	Sensor	Resolution		Identifier	
		Spatial	Spectral	Path	Row
Landsat	Landsat 7 ETM+ Landsat 8 OLI/TIRS	30m		171	56
				172	57
				173	58
				174	59
				175	60
				176	61
				177	62

			0,45 – 2,35 µm	178	63
				179	64
				180	65
				181	66
				182	67
				183	68
				184	69

Table #8: Remote sensing datasets used in this project.

2.2 Define classes of Land-Use & Land Cover: The principle land cover classes chosen were Primary Forests, Secondary forests, Savannah, Swamp, Water bodies, Agriculture, and built-up areas.

Class Identifier			Trend in Carbon stock[1]	Presence in[2]	Baseline activity[3]		Description
ID_{cl}	Name	Broad Class			LG	SA	(including criteria for unambiguous boundary definition)
001	Dense Forest	Forest Land	Decreasing	RR	Yes	Yes	
002	Sparse Forest	Forest Land	Decreasing	RR	Yes	Yes	

Table #9: Land cover and land use classes in this project.

2.3 Define categories of land-use & Land Cover: The principle classes identified were reclassified or stratified into two classes' viz., Primary forests, swamp forests to dense forest, and Secondary & Savannah forests to sparse forests.

Land Cover Type	**Dense Forest 2016**	**Sparse Forest 2016**	**Total**
Dense Forest 2001	0.8200	0.1800	1.0000
Sparse Forest 2001	0.0000	0.9200	1.0000

Table #10: Land Cover change matrix

2.4 Analysis of historical Land-Use and Land-cover change: This step is further divided into three steps: a. Pre-processing, b. Classification and interpretation, and c. Post-processing.

2.4.1 Pre-processing: In this project the pre-processed datasets available of Google Earth Engine platform which are provided by United States Geological Survey (USGS) called Landsat Collection 1 Tier-1 is used. The Tier 1 includes Level-1 Precision and Terrain (L1TP). These datasets are corrected having well-characterized radiometry and are inter-calibrated across the different Landsat instruments. The co-registration of Tier 1 scenes is consistent and the tolerances is less than half a pixel i.e., ≦ 12-meter radial root mean square error (RMSE). Hence, these datasets have highest quality and are considered suitable for time-series analysis. A Landsat mosaic was built over these areas which had cloud cover less than 20%. The datasets were Top of Atmospheric corrected as suggested by Chander et. all., 2009.

2.4.2 Classification and interpretation: The Landsat datasets were classified using the ground-truth data collected on the ground from the randomly stratified points using the QGIS v2.14.9. The ground trothed points were used to train the image using Random forest algorithm using 10 trees.

2.4.3 Post-processing: The post-processing was carried using Land-cover change modeling algorithm built in Terrset Software v18.0 tailor made for REDD+ analysis. The land cover classification and accuracy assessment was done using cloud based platform - Google Earth Engine (GEE) through Java-scripting.

2.5 Map accuracy assessment: All the classified images were assessed for quality as suggested in VM0015. The classified image had overall accuracy greater than 90% and the minimum classification accuracy for each class was 80%. The Kappa coefficient was used to measure the accuracy. The accuracy was assessed only at the most recent date, for which ground-truthing data that was collected (Vázquez-Quintero, 2016).

3. Analysis of Agents, drivers and underlying causes of deforestation

3.1 Identification of agents of deforestation: In the next step, the identification and analysis of the deforestation agents was carried out with likely future development through literature review, field visits, hybrid Google earth maps and expert consultations. During this step, the agents identified were farmers, smallholders, and loggers.

3.2 Identification of deforestation drivers: These agents were usually converting the forests for cattle ranching, cash-crop production, and subsistence farming by using fire.

S.I	Agents	Conversion to	Underlying Causes	Ranking
1	Farmers	Subsistence Farming, Cash-crop production.	Population pressure; Poverty and wealth; Property regime;	High
) 2	Loggers	Charcoal Production.	Poverty and wealth; Property regime;	High

Table #11: Deforestation agent's analysis

3.3 Identification of underlying causes of deforestation: During the baseline assessment the underlying causes for the deforestation were found to commercial cropping, logging for commercial sales & fuel wood and Population expansion resulting in demand.

3.4 Analysis of chain of events leading to deforestation: During the baseline assessment the sequence of analysis of chain of events were studied using the literature review, locals, exports and web resources. According to the analysis, most of the deforestation was done by the poor farmers and poor villagers who rely on forest lands for agriculture and fuel wood collection. Slash-and-burn is commonly used for clearing forest**.**

3.5 Conclusion: The future deforestation trend within the reference region and project area is "conclusive" which means that the hypothesized relationships between agent groups, driver variables, underlying causes and historical levels of deforestation can be verified using the statistical tests/techniques, literature studies/reviews, or other online resources such as WWF, which is documented & information provided by local experts, communities, deforestation agents, and KMS project team having good knowledge about the project area and the reference region. Further, the overall trend is likely to increase due to population explosion, food and well-being demands.

4.0 Projection of location of future deforestation: The objective of this step was to locate the deforestation in space and time for the first fixed baseline period and also for the project crediting period (this is optional).

4.1 Projection of the quantity of future deforestation

This step includes two steps:

4.1.1 Selection of the baseline approach.

To project future deforestation, the entire region is stratified according to the findings of step 3 and different deforestation rates be estimated for each stratum using option "C" i.e., modeling approach because conclusive evidence were obtained from the analysis of agents and drivers explaining the different historical deforestation which reveal a clear trend in increasing order. Further, the annual areas baseline deforestation within the reference region was estimated to determine the annual areas and location of deforestation in the project area and leakage belt.

4.1.2. Quantitative projection of future deforestation.

Area deforested per forest class icl within the reference region					Total baseline deforestation in the project area	
ABSLRR i; icl > Name >	Dense Forest	Sparse Forest	...	icl	ABSLRR annual	ABSLRR cumulative
	Forest					
Project year t	ha	ha	ha	ha	ha	ha
1	9.44.154	1.34.447			10,78,601	10,78,601
2	18.88.308	2.68.894			21,57,202	32,35,803
3	18.88.308	2.68.894			21,57,202	53,93,004
4	18.88.308	2.68.894			21,57,202	75,50,206
5	4.72.077	67.223			5,39,300	80,89,506
6	18.88.308	2.68.894			21,57,202	1,02,46,708
7	18.88.308	2.68.894			21,57,202	1,24,03,910
8	18.88.308	2.68.894			21,57,202	1,45,61,111
9	18.88.308	2.68.894			21,57,202	1,67,18,313
10	18.88.308	2.68.894			21,57,202	1,88,75,515
11	18.88.308	2.68.894			21,57,202	2,10,32,716
12	18.88.308	2.68.894			21,57,202	2,31,89,918
13	18.88.308	2.68.894			21,57,202	2,53,47,120
14	18.88.308	2.68.894			21,57,202	2,75,04,321
15	18.88.308	2.68.894			21,57,202	2,96,61,523
16	18.88.308	2.68.894			21,57,202	3,18,18,725
17	18.88.308	2.68.894			21,57,202	3,39,75,926
18	18.88.308	2.68.894			21,57,202	3,61,33,128
19	18.88.308	2.68.894			21,57,202	3,82,90,330
20	18.88.308	2.68.894			21,57,202	4,04,47,531
21	18.88.308	2.68.894			21,57,202	4,26,04,733
22	18.88.308	2.68.894			21,57,202	4,47,61,935
23	18.88.308	2.68.894			21,57,202	4,69,19,136
24	18.88.308	2.68.894			21,57,202	4,90,76,338
25	18.88.308	2.68.894			21,57,202	5,12,33,540
26	18.88.308	2.68.894			21,57,202	5,33,90,741
27	18.88.308	2.68.894			21,57,202	5,55,47,943
28	18.88.308	2.68.894			21,57,202	5,77,05,145
29	18.88.308	2.68.894			21,57,202	5,98,62,346
30	18.88.308	2.68.894			21,57,202	6,20,19,548
31	18.88.308	2.68.894			21,57,202	6,41,76,750
32	18.88.308	2.68.894			21,57,202	6,63,33,951
33	18.88.308	2.68.894			21,57,202	6,84,91,153
34	18.88.308	2.68.894			21,57,202	7,06,48,355
35	18.88.308	2.68.894			21,57,202	7,28,05,556
36	18.88.308	2.68.894			21,57,202	7,49,62,758
37	18.88.308	2.68.894			21,57,202	7,71,19,960
38	18.88.308	2.68.894			21,57,202	7,92,77,161
39	18.88.308	2.68.894			21,57,202	8,14,34,363
40	18.88.308	2.68.894			21,57,202	8,35,91,565
41	18.88.308	2.68.894			21,57,202	8,57,48,766
42	18.88.308	2.68.894			21,57,202	8,79,05,968
43	18.88.308	2.68.894			21,57,202	9,00,63,170
44	18.88.308	2.68.894			21,57,202	9,22,20,371
45	18.88.308	2.68.894			21,57,202	9,43,77,573
46	18.88.308	2.68.894			21,57,202	9,65,34,775
47	18.88.308	2.68.894			21,57,202	9,86,91,976
48	18.88.308	2.68.894			21,57,202	10,08,49,178
49	18.88.308	2.68.894			21,57,202	10,30,06,380
50	18.88.308	2.68.894			21,57,202	10,51,63,581
51	18.88.308	2.68.894			21,57,202	10,73,20,783
52	18.88.308	2.68.894			21,57,202	10,94,77,985
53	18.88.308	2.68.894			21,57,202	11,16,35,186
54	18.88.308	2.68.894			21,57,202	11,37,92,388
55	18.88.308	2.68.894			21,57,202	11,59,49,590
56	18.88.308	2.68.894			21,57,202	11,81,06,791
57	18.88.308	2.68.894			21,57,202	12,02,63,993
58	18.88.308	2.68.894			21,57,202	12,24,21,195
59	18.88.308	2.68.894			21,57,202	12,45,78,396
60	18.88.308	2.68.894			21,57,202	12,67,35,598
61	18.88.308	2.68.894			21,57,202	12,88,92,800
62	18.88.308	2.68.894			21,57,202	13,10,50,001
63	18.88.308	2.68.894			21,57,202	13,32,07,203
64	18.88.308	2.68.894			21,57,202	13,53,64,405
65	18.88.308	2.68.894			21,57,202	13,75,21,606
66	18.88.308	2.68.894			21,57,202	13,96,78,808
67	18.88.308	2.68.894			21,57,202	14,18,36,010
68	18.88.308	2.68.894			21,57,202	14,39,93,211
69	18.88.308	2.68.894			21,57,202	14,61,50,413
70	18.88.308	2.68.894			21,57,202	14,83,07,615
71	18.88.308	2.68.894			21,57,202	15,04,64,816
72	18.88.308	2.68.894			21,57,202	15,26,22,018
73	18.88.308	2.68.894			21,57,202	15,47,79,220
74	18.88.308	2.68.894			21,57,202	15,69,36,421
75	18.88.308	2.68.894			21,57,202	15,90,93,623
76	18.88.308	2.68.894			21,57,202	16,12,50,825
77	18.88.308	2.68.894			21,57,202	16,34,08,026
78	18.88.308	2.68.894			21,57,202	16,55,65,228
79	18.88.308	2.68.894			21,57,202	16,77,22,430
80	18.88.308	2.68.894			21,57,202	16,98,79,631
81	18.88.308	2.68.894			21,57,202	17,20,36,833
82	18.88.308	2.68.894			21,57,202	17,41,94,035
83	18.88.308	2.68.894			21,57,202	17,63,51,236
84	18.88.308	2.68.894			21,57,202	17,85,08,438
85	18.88.308	2.68.894			21,57,202	18,06,65,640
86	18.88.308	2.68.894			21,57,202	18,28,22,841
87	18.88.308	2.68.894			21,57,202	18,49,80,043
88	18.88.308	2.68.894			21,57,202	18,71,37,245
89	18.88.308	2.68.894			21,57,202	18,92,94,446
90	18.88.308	2.68.894			21,57,202	19,14,51,648
91	18.88.308	2.68.894			21,57,202	19,36,08,850
92	18.88.308	2.68.894			21,57,202	19,57,66,051
93	18.88.308	2.68.894			21,57,202	19,79,23,253
94	18.88.308	2.68.894			21,57,202	20,00,80,455
95	18.88.308	2.68.894			21,57,202	20,22,37,656
96	18.88.308	2.68.894			21,57,202	20,43,94,858
97	18.88.308	2.68.894			21,57,202	20,65,52,060
98	18.88.308	2.68.894			21,57,202	20,87,09,261
99	18.88.308	2.68.894			21,57,202	21,08,66,463
100	18.88.308	2.68.894			21,57,202	21,30,23,665
T						

Table # 12: Quantitative projection of deforestation in Reference region.

Area deforested per forest class icl within the project area					Total baseline deforestation in the project area	
ABSLPA i,cl,t Name >	Dense Forest	Sparse Forest	...	icl		
	Forest				ABSLPA annual	ABSLPA cumulative
Project year t	ha	ha	ha	ha	ha	ha
1	1,74,000	327			1,74,327	1,74,327
2	3,48,000	654			3,48,654	5,22,980
3	3,48,000	654			3,48,654	8,71,634
4	3,48,000	654			3,48,654	12,20,288
5	87,000	163			87,163	13,07,451
6	3,48,000	654			3,48,654	16,56,105
7	3,48,000	654			3,48,654	20,04,759
8	3,48,000	654			3,48,654	23,53,412
9	3,48,000	654			3,48,654	27,02,066
10	3,48,000	654			3,48,654	30,50,720
11	3,48,000	654			3,48,654	33,99,373
12	3,48,000	654			3,48,654	37,48,027
13	3,48,000	654			3,48,654	40,96,681
14	3,48,000	654			3,48,654	44,45,334
15	3,48,000	654			3,48,654	47,93,988
16	3,48,000	654			3,48,654	51,42,642
17	3,48,000	654			3,48,654	54,91,295
18	3,48,000	654			3,48,654	58,39,949
19	3,48,000	654			3,48,654	61,88,603
20	3,48,000	654			3,48,654	65,37,256
21	3,48,000	654			3,48,654	68,85,910
22	3,48,000	654			3,48,654	72,34,564
23	3,48,000	654			3,48,654	75,83,217
24	3,48,000	654			3,48,654	79,31,871
25	3,48,000	654			3,48,654	82,80,525
26	3,48,000	654			3,48,654	86,29,178
27	3,48,000	654			3,48,654	89,77,832
28	3,48,000	654			3,48,654	93,26,486
29	3,48,000	654			3,48,654	96,75,139
30	3,48,000	654			3,48,654	1,00,23,793
31	3,48,000	654			3,48,654	1,03,72,447
32	3,48,000	654			3,48,654	1,07,21,100
33	3,48,000	654			3,48,654	1,10,69,754
34	3,48,000	654			3,48,654	1,14,18,408
35	3,48,000	654			3,48,654	1,17,67,061
36	3,48,000	654			3,48,654	1,21,15,715
37	3,48,000	654			3,48,654	1,24,64,369
38	3,48,000	654			3,48,654	1,28,13,022
39	3,48,000	654			3,48,654	1,31,61,676
40	3,48,000	654			3,48,654	1,35,10,330
41	3,48,000	654			3,48,654	1,38,58,983
42	3,48,000	654			3,48,654	1,42,07,637
43	3,48,000	654			3,48,654	1,45,56,291
44	3,48,000	654			3,48,654	1,49,04,944
45	3,48,000	654			3,48,654	1,52,53,598
46	3,48,000	654			3,48,654	1,56,02,252
47	3,48,000	654			3,48,654	1,59,50,905
48	3,48,000	654			3,48,654	1,62,99,559
49	3,48,000	654			3,48,654	1,66,48,213
50	3,48,000	654			3,48,654	1,69,96,866
51	3,48,000	654			3,48,654	1,73,45,520
52	3,48,000	654			3,48,654	1,76,94,174
53	3,48,000	654			3,48,654	1,80,42,827
54	3,48,000	654			3,48,654	1,83,91,481
55	3,48,000	654			3,48,654	1,87,40,135
56	3,48,000	654			3,48,654	1,90,88,788
57	3,48,000	654			3,48,654	1,94,37,442
58	3,48,000	654			3,48,654	1,97,86,096
59	3,48,000	654			3,48,654	2,01,34,749
60	3,48,000	654			3,48,654	2,04,83,403
61	3,48,000	654			3,48,654	2,08,32,057
62	3,48,000	654			3,48,654	2,11,80,710
63	3,48,000	654			3,48,654	2,15,29,364
64	3,48,000	654			3,48,654	2,18,78,018
65	3,48,000	654			3,48,654	2,22,26,671
66	3,48,000	654			3,48,654	2,25,75,325
67	3,48,000	654			3,48,654	2,29,23,979
68	3,48,000	654			3,48,654	2,32,72,632
69	3,48,000	654			3,48,654	2,36,21,286
70	3,48,000	654			3,48,654	2,39,69,940
71	3,48,000	654			3,48,654	2,43,18,593
72	3,48,000	654			3,48,654	2,46,67,247
73	3,48,000	654			3,48,654	2,50,15,901
74	3,48,000	654			3,48,654	2,53,64,554
75	3,48,000	654			3,48,654	2,57,13,208
76	3,48,000	654			3,48,654	2,60,61,862
77	3,48,000	654			3,48,654	2,64,10,515
78	3,48,000	654			3,48,654	2,67,59,169
79	3,48,000	654			3,48,654	2,71,07,823
80	3,48,000	654			3,48,654	2,74,56,476
81	3,48,000	654			3,48,654	2,78,05,130
82	3,48,000	654			3,48,654	2,81,53,784
83	3,48,000	654			3,48,654	2,85,02,437
84	3,48,000	654			3,48,654	2,88,51,091
85	3,48,000	654			3,48,654	2,91,99,745
86	3,48,000	654			3,48,654	2,95,48,398
87	3,48,000	654			3,48,654	2,98,97,052
88	3,48,000	654			3,48,654	3,02,45,706
89	3,48,000	654			3,48,654	3,05,94,359
90	3,48,000	654			3,48,654	3,09,43,013
91	3,48,000	654			3,48,654	3,12,91,667
92	3,48,000	654			3,48,654	3,16,40,320
93	3,48,000	654			3,48,654	3,19,88,974
94	3,48,000	654			3,48,654	3,23,37,628
95	3,48,000	654			3,48,654	3,26,86,281
96	3,48,000	654			3,48,654	3,30,34,935
97	3,48,000	654			3,48,654	3,33,83,589
98	3,48,000	654			3,48,654	3,37,32,242
99	3,48,000	654			3,48,654	3,40,80,896
100	3,48,000	654			3,48,654	3,44,29,550
T						

Table # 13: Annual areas deforested in each zone within the project area in the baseline case.

Area deforested per forest class fcl within the leakage belt					Total baseline deforestation in the project area	
ABSLLK ; icl >	Dense Forest	Sparse Forest	...	icl		
Name >	Forest				ABSLLK annual	ABSLLK cumulative
Project year t	ha	ha	ha	ha	ha	ha
1	670	133			804	804
2	1,341	267			1,607	2,411
3	1,341	267			1,607	4,018
4	1,341	267			1,607	5,626
5	335	67			402	6,027
6	1,341	267			1,607	7,635
7	1,341	267			1,607	9,242
8	1,341	267			1,607	10,849
9	1,341	267			1,607	12,456
10	1,341	267			1,607	14,064
11	1,341	267			1,607	15,671
12	1,341	267			1,607	17,278
13	1,341	267			1,607	18,886
14	1,341	267			1,607	20,493
15	1,341	267			1,607	22,100
16	1,341	267			1,607	23,708
17	1,341	267			1,607	25,315
18	1,341	267			1,607	26,922
19	1,341	267			1,607	28,529
20	1,341	267			1,607	30,137
21	1,341	267			1,607	31,744
22	1,341	267			1,607	33,351
23	1,341	267			1,607	34,959
24	1,341	267			1,607	36,566
25	1,341	267			1,607	38,173
26	1,341	267			1,607	39,780
27	1,341	267			1,607	41,388
28	1,341	267			1,607	42,995
29	1,341	267			1,607	44,602
30	1,341	267			1,607	46,210
31	1,341	267			1,607	47,817
32	1,341	267			1,607	49,424
33	1,341	267			1,607	51,031
34	1,341	267			1,607	52,639
35	1,341	267			1,607	54,246
36	1,341	267			1,607	55,853
37	1,341	267			1,607	57,461
38	1,341	267			1,607	59,068
39	1,341	267			1,607	60,675
40	1,341	267			1,607	62,282
41	1,341	267			1,607	63,890
42	1,341	267			1,607	65,497
43	1,341	267			1,607	67,104
44	1,341	267			1,607	68,712
45	1,341	267			1,607	70,319
46	1,341	267			1,607	71,926
47	1,341	267			1,607	73,534
48	1,341	267			1,607	75,141
49	1,341	267			1,607	76,748
50	1,341	267			1,607	78,355
51	1,341	267			1,607	79,963
52	1,341	267			1,607	81,570
53	1,341	267			1,607	83,177
54	1,341	267			1,607	84,785
55	1,341	267			1,607	86,392
56	1,341	267			1,607	87,999
57	1,341	267			1,607	89,606
58	1,341	267			1,607	91,214
59	1,341	267			1,607	92,821
60	1,341	267			1,607	94,428
61	1,341	267			1,607	96,036
62	1,341	267			1,607	97,643
63	1,341	267			1,607	99,250
64	1,341	267			1,607	1,00,857
65	1,341	267			1,607	1,02,465
66	1,341	267			1,607	1,04,072
67	1,341	267			1,607	1,05,679
68	1,341	267			1,607	1,07,287
69	1,341	267			1,607	1,08,894
70	1,341	267			1,607	1,10,501
71	1,341	267			1,607	1,12,108
72	1,341	267			1,607	1,13,716
73	1,341	267			1,607	1,15,323
74	1,341	267			1,607	1,16,930
75	1,341	267			1,607	1,18,538
76	1,341	267			1,607	1,20,145
77	1,341	267			1,607	1,21,752
78	1,341	267			1,607	1,23,360
79	1,341	267			1,607	1,24,967
80	1,341	267			1,607	1,26,574
81	1,341	267			1,607	1,28,181
82	1,341	267			1,607	1,29,789
83	1,341	267			1,607	1,31,396
84	1,341	267			1,607	1,33,003
85	1,341	267			1,607	1,34,611
86	1,341	267			1,607	1,36,218
87	1,341	267			1,607	1,37,825
88	1,341	267			1,607	1,39,432
89	1,341	267			1,607	1,41,040
90	1,341	267			1,607	1,42,647
91	1,341	267			1,607	1,44,254
92	1,341	267			1,607	1,45,862
93	1,341	267			1,607	1,47,469
94	1,341	267			1,607	1,49,076
95	1,341	267			1,607	1,50,683
96	1,341	267			1,607	1,52,291
97	1,341	267			1,607	1,53,898
98	1,341	267			1,607	1,55,505
99	1,341	267			1,607	1,57,113
100	1,341	267			1,607	1,58,720
T						

Table 14: Annual areas deforested in each zone within the leakage belt in the baseline case

4.2.1 Preparation of factor maps:

Based on the identification & analysis of deforestation agents and to Project of quantity of future deforestation, the factor maps were prepared by obtaining the data such as roads, locations etc., from the open street maps (OSM, https://www.geofabrik.de/data/download.html). In this criteria, we used empirical approach to asses wall-to-wall approach from socio-economic surveys, expert opinions, and field knowledge to estimate the deforestation in reference region using empirical approach. This approach was preferred due to lack of information of the areas deforested in the historical deforestation.

4.2.2 Preparation of deforestation risk maps:

The Deforestation risk map at each pixel location estimated by normalized index of the human pressures were collected and developed for DRC. To calculate the Risk Map the entire Project area was gridded by 1x1km and computed the Human influence factor for each grid by utilizing the 5 different types of pressure created by Human's in the Reference area. The following factors were used for creating index such as 1) Human population density having resolution of 30minutes for the year 2015 (GPW V4.0, 1), 2) Roads, 3) Railways downloaded from Diva-GIS website (http://www.diva-gis.org/Data), 4) night light (SEDAC), 5) Land cover having resolution of 30m developed in this project. Each grid's weighted according the relative levels of human pressure on the scale of 0-100 and then summed up. The final scores obtained were normalized using the formula (1) for each grid to obtain the risk value on the scale of 1-100 which was used for final mapping.

$$Xn=(X – Xmin)/(Xmax – X)$$

Where X is the value of data per grid
Xn= normalized value of grid
Xmax = maximum value of per grid
Xmin = minimum value per grid

For each grid we assigned a value of "0" to all the locations where the human influence is minimum risk and a value of "100" to all the locations having human influence were maximum (see table below for the criteria used to map the deforestation risk). Several Risk Maps were computed using the GIS software with different combinations of Factor Maps.

Population density		Railroads		Major Roads		Urban Polygons		Night light		Land cover	
0 - 0.5	0	Within 2km of Railroads.	80	Within 2 km of roads.	80	Within Urban Polygons.	90	0	0	Urban	90
0.6 - 1.5	10	Beyond 2km	0	Within 2 to 15 km of major roads.	40	Outside Urban Polygons	0	1 - 38	3	Agriculture, Irrigated	80
1.6 - 2.5	20			Within 2 to 15 km of major roads.	90			39 - 88	6	Rain-fed	30
2.6 - 3.5	30							>=89	10	Others	0
3.6 - 4.5	40										
4.6 - 5.5	50										

5.6 - 6.5	60										
6.6 - 7.5	70										
7.6 - 8.5	80										
8.6 - 9.5	90										
> 9.5	100										

Table #15: Criteria used for computing MCE.

4.2.3 Selection of the most accurate deforestation risk map: To select the most appropriate risk map we used a good practice approach i.e., validation and confirmation as stated in the VM0015 methods. The calibration and confirmation has been sub-divided into two different approaches: a). calibration and confirmation with two historical sub-periods, and b). calibration and confirmation using tiles. The best fit and/or final deforestation map selected is shown below:

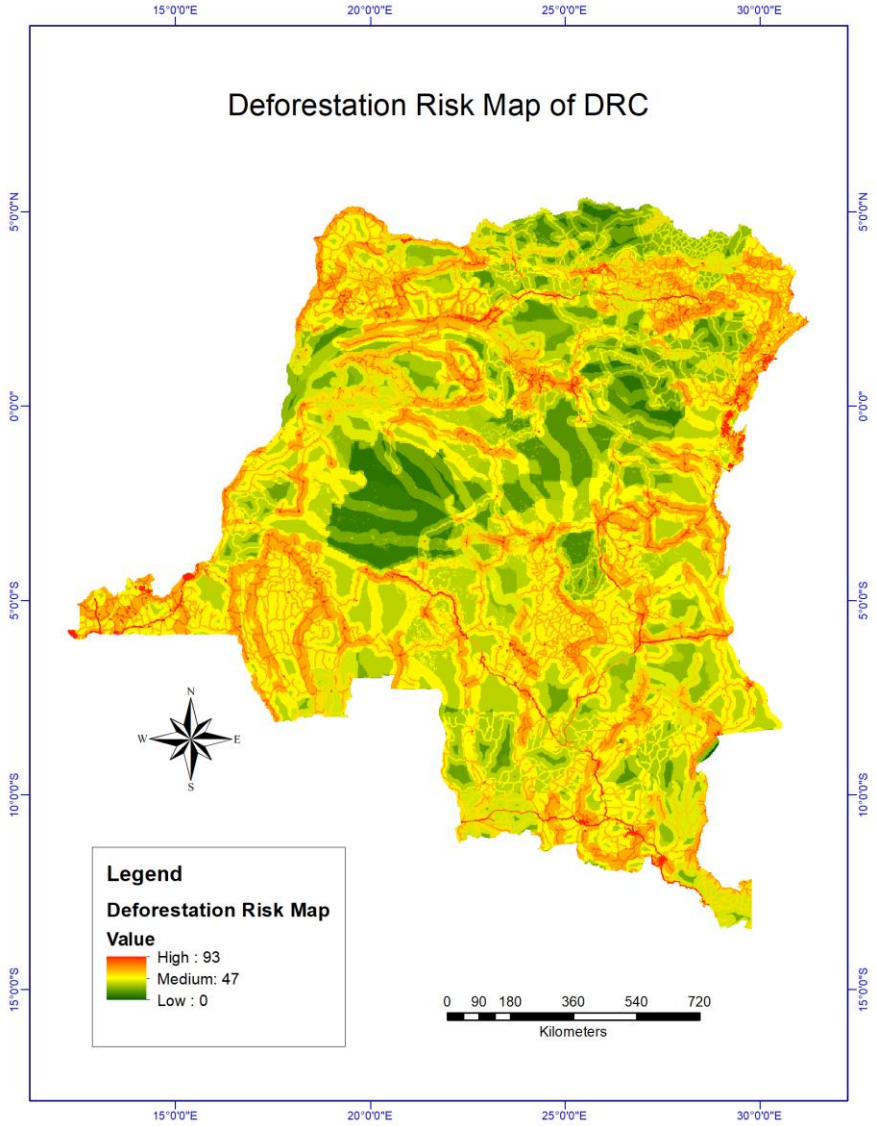

Figure # 12: Deforestation risk map developed for the Democratic Republic of Congo.

4.2.4 Mapping of the location of future deforestation.

The mapping of the location of future deforestation is estimated based on the assumption that deforestation happens first at the pixel locations with the highest deforestation risk value. The below is the deforestation risk map depicting the location of future deforestation in project area, reference region and leakage areas.

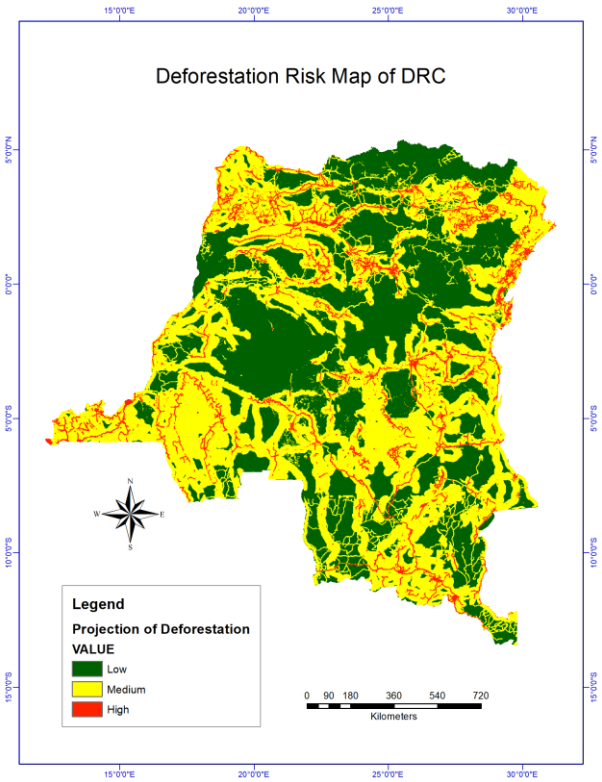

***Figure # 13**:* Location of future deforestation risk in DRC.

5. Definition of the land-use and land-cover change component of the baseline.

The aim/goal of this step is to calculate the activity data of the initial forest classes that will be deforested and activity data of the post-deforestation classes that will replace them in the baseline case.

5.1 Calculation of baseline activity data: A suite of maps were produced showing for each forest class which polygons would be deforested each year in the absence of the National REDD+ project in DRC. An example for one year is shown below and the other maps are available to the auditor on request. We extracted from these maps the number of hectares of each forest class that will be deforested in the reference region, the project area and the leakage belt.

a deforested per forest class fcl within the reference re					Total baseline deforestation in the project area	
ABSLRR; icl > Name >	Dense Forest	Sparse Forest	...	/cl	ABSLRR annual	ABSLRR cumulative
	Forest					
Project year t	ha	ha	ha	ha	ha	ha
1	9,44,154	1,34,447			10,78,601	10,78,601
2	18,88,308	2,68,894			21,57,202	32,35,803
3	18,88,308	2,68,894			21,57,202	53,93,004
4	18,88,308	2,68,894			21,57,202	75,50,206
5	4,72,077	67,223			5,39,300	80,89,506
6	18,88,308	2,68,894			21,57,202	1,02,46,708
7	18,88,308	2,68,894			21,57,202	1,24,03,910
8	18,88,308	2,68,894			21,57,202	1,45,61,111
9	18,88,308	2,68,894			21,57,202	1,67,18,313
10	18,88,308	2,68,894			21,57,202	1,88,75,515
11	18,88,308	2,68,894			21,57,202	2,10,32,716
12	18,88,308	2,68,894			21,57,202	2,31,89,918
13	18,88,308	2,68,894			21,57,202	2,53,47,120
14	18,88,308	2,68,894			21,57,202	2,75,04,321
15	18,88,308	2,68,894			21,57,202	2,96,61,523
16	18,88,308	2,68,894			21,57,202	3,18,18,725
17	18,88,308	2,68,894			21,57,202	3,39,75,926
18	18,88,308	2,68,894			21,57,202	3,61,33,128
19	18,88,308	2,68,894			21,57,202	3,82,90,330
20	18,88,308	2,68,894			21,57,202	4,04,47,531
21	18,88,308	2,68,894			21,57,202	4,26,04,733
22	18,88,308	2,68,894			21,57,202	4,47,61,935
23	18,88,308	2,68,894			21,57,202	4,69,19,136
24	18,88,308	2,68,894			21,57,202	4,90,76,338
25	18,88,308	2,68,894			21,57,202	5,12,33,540
26	18,88,308	2,68,894			21,57,202	5,33,90,741
27	18,88,308	2,68,894			21,57,202	5,55,47,943
28	18,88,308	2,68,894			21,57,202	5,77,05,145
29	18,88,308	2,68,894			21,57,202	5,98,62,346
30	18,88,308	2,68,894			21,57,202	6,20,19,548
31	18,88,308	2,68,894			21,57,202	6,41,76,750
32	18,88,308	2,68,894			21,57,202	6,63,33,951
33	18,88,308	2,68,894			21,57,202	6,84,91,153
34	18,88,308	2,68,894			21,57,202	7,06,48,355
35	18,88,308	2,68,894			21,57,202	7,28,05,556
36	18,88,308	2,68,894			21,57,202	7,49,62,758
37	18,88,308	2,68,894			21,57,202	7,71,19,960
38	18,88,308	2,68,894			21,57,202	7,92,77,161
39	18,88,308	2,68,894			21,57,202	8,14,34,363
40	18,88,308	2,68,894			21,57,202	8,35,91,565
41	18,88,308	2,68,894			21,57,202	8,57,48,766
42	18,88,308	2,68,894			21,57,202	8,79,05,968
43	18,88,308	2,68,894			21,57,202	9,00,63,170
44	18,88,308	2,68,894			21,57,202	9,22,20,371
45	18,88,308	2,68,894			21,57,202	9,43,77,573
46	18,88,308	2,68,894			21,57,202	9,65,34,775
47	18,88,308	2,68,894			21,57,202	9,86,91,976
48	18,88,308	2,68,894			21,57,202	10,08,49,178
49	18,88,308	2,68,894			21,57,202	10,30,06,380
50	18,88,308	2,68,894			21,57,202	10,51,63,581
51	18,88,308	2,68,894			21,57,202	10,73,20,783
52	18,88,308	2,68,894			21,57,202	10,94,77,985
53	18,88,308	2,68,894			21,57,202	11,16,35,186
54	18,88,308	2,68,894			21,57,202	11,37,92,388
55	18,88,308	2,68,894			21,57,202	11,59,49,590
56	18,88,308	2,68,894			21,57,202	11,81,06,791
57	18,88,308	2,68,894			21,57,202	12,02,63,993
58	18,88,308	2,68,894			21,57,202	12,24,21,195
59	18,88,308	2,68,894			21,57,202	12,45,78,396
60	18,88,308	2,68,894			21,57,202	12,67,35,598
61	18,88,308	2,68,894			21,57,202	12,88,92,800
62	18,88,308	2,68,894			21,57,202	13,10,50,001
63	18,88,308	2,68,894			21,57,202	13,32,07,203
64	18,88,308	2,68,894			21,57,202	13,53,64,405
65	18,88,308	2,68,894			21,57,202	13,75,21,606
66	18,88,308	2,68,894			21,57,202	13,96,78,808
67	18,88,308	2,68,894			21,57,202	14,18,36,010
68	18,88,308	2,68,894			21,57,202	14,39,93,211
69	18,88,308	2,68,894			21,57,202	14,61,50,413
70	18,88,308	2,68,894			21,57,202	14,83,07,615
71	18,88,308	2,68,894			21,57,202	15,04,64,816
72	18,88,308	2,68,894			21,57,202	15,26,22,018
73	18,88,308	2,68,894			21,57,202	15,47,79,220
74	18,88,308	2,68,894			21,57,202	15,69,36,421
75	18,88,308	2,68,894			21,57,202	15,90,93,623
76	18,88,308	2,68,894			21,57,202	16,12,50,825
77	18,88,308	2,68,894			21,57,202	16,34,08,026
78	18,88,308	2,68,894			21,57,202	16,55,65,228
79	18,88,308	2,68,894			21,57,202	16,77,22,430
80	18,88,308	2,68,894			21,57,202	16,98,79,631
81	18,88,308	2,68,894			21,57,202	17,20,36,833
82	18,88,308	2,68,894			21,57,202	17,41,94,035
83	18,88,308	2,68,894			21,57,202	17,63,51,236
84	18,88,308	2,68,894			21,57,202	17,85,08,438
85	18,88,308	2,68,894			21,57,202	18,06,65,640
86	18,88,308	2,68,894			21,57,202	18,28,22,841
87	18,88,308	2,68,894			21,57,202	18,49,80,043
88	18,88,308	2,68,894			21,57,202	18,71,37,245
89	18,88,308	2,68,894			21,57,202	18,92,94,446
90	18,88,308	2,68,894			21,57,202	19,14,51,648
91	18,88,308	2,68,894			21,57,202	19,36,08,850
92	18,88,308	2,68,894			21,57,202	19,57,66,051
93	18,88,308	2,68,894			21,57,202	19,79,23,253
94	18,88,308	2,68,894			21,57,202	20,00,80,455
95	18,88,308	2,68,894			21,57,202	20,22,37,656
96	18,88,308	2,68,894			21,57,202	20,43,94,858
97	18,88,308	2,68,894			21,57,202	20,65,52,060
98	18,88,308	2,68,894			21,57,202	20,87,09,261
99	18,88,308	2,68,894			21,57,202	21,08,66,463
100	18,88,308	2,68,894			21,57,202	21,30,23,665
T						

Table # 16: Annual areas deforested per forest class within the Reference Region in the baseline Case (activity data per forest class).

Project year	Carbon stock changes in final (post-deforestation) non-forest classes								Total C stock change in final non-forest classes	
	$AD_{y,pf}$ - 1		$AD_{y,pf}$ - 2		$AD_{y,pf}$ - ...		$AD_{y,pf}$ - Fcl		annual	cumulative
	$ABSLPA_{y,1}$	$Ctot_{y,1}$	$ABSLPA_{y,2}$	$Ctot_{y,2}$	$ABSLPA_{y,...}$	$Ctot_{y,...}$	$ABSLPA_{y,Fcl}$	$Ctot_{y,Fcl}$	$\Delta CBSLPA_y$	$\Sigma \Delta CBSLPA_y$
	ha	tCO2e/ha	ha	tCO2e/ha	ha	tCO2e/ha	ha	tCO2e/ha	tCO2e	tCO2e
1	1,78,831	849							15,18,64,881	15,18,64,881
2	1,78,831	849							15,18,64,881	30,37,29,761
3	1,78,831	849							15,18,64,881	45,55,94,642
4	1,78,831	849							15,18,64,881	60,74,59,523
5	44,708	849							3,79,66,220	64,54,25,743
6	1,78,831	849							15,18,64,881	79,72,90,624
7	1,78,831	849							15,18,64,881	94,91,55,505
8	1,78,831	849							15,18,64,881	1,10,10,20,385
9	1,78,831	849							15,18,64,881	1,25,28,85,266
10	1,78,831	849							15,18,64,881	1,40,47,50,147
11	1,78,831	849							15,18,64,881	1,55,66,15,028
12	1,78,831	849							15,18,64,881	1,70,84,79,908
13	1,78,831	849							15,18,64,881	1,86,03,44,789
14	1,78,831	849							15,18,64,881	2,01,22,09,670
15	1,78,831	849							15,18,64,881	2,16,40,74,551
16	1,78,831	849							15,18,64,881	2,31,59,39,431
17	1,78,831	849							15,18,64,881	2,46,78,04,312
18	1,78,831	849							15,18,64,881	2,61,96,69,193
19	1,78,831	849							15,18,64,881	2,77,15,34,073
20	1,78,831	849							15,18,64,881	2,92,33,98,954
21	1,78,831	849							15,18,64,881	3,07,52,63,835
22	1,78,831	849							15,18,64,881	3,22,71,28,716
23	1,78,831	849							15,18,64,881	3,37,89,93,596
24	1,78,831	849							15,18,64,881	3,53,08,58,477
25	1,78,831	849							15,18,64,881	3,68,27,23,358
26	1,78,831	849							15,18,64,881	3,83,45,88,239
27	1,78,831	849							15,18,64,881	3,98,64,53,119
28	1,78,831	849							15,18,64,881	4,13,83,18,000
29	1,78,831	849							15,18,64,881	4,29,01,82,881
30	1,78,831	849							15,18,64,881	4,44,20,47,762
31	1,78,831	849							15,18,64,881	4,59,39,12,642
32	1,78,831	849							15,18,64,881	4,74,57,77,523
33	1,78,831	849							15,18,64,881	4,89,76,42,404
34	1,78,831	849							15,18,64,881	5,04,95,07,285
35	1,78,831	849							15,18,64,881	5,20,13,72,165
36	1,78,831	849							15,18,64,881	5,35,32,37,046
37	1,78,831	849							15,18,64,881	5,50,51,01,927
38	1,78,831	849							15,18,64,881	5,65,69,66,808
39	1,78,831	849							15,18,64,881	5,80,88,31,688
40	1,78,831	849							15,18,64,881	5,96,06,96,569
41	1,78,831	849							15,18,64,881	6,11,25,61,450
42	1,78,831	849							15,18,64,881	6,26,44,26,330
43	1,78,831	849							15,18,64,881	6,41,62,91,211
44	1,78,831	849							15,18,64,881	6,56,81,56,092
45	1,78,831	849							15,18,64,881	6,72,00,20,973
46	1,78,831	849							15,18,64,881	6,87,18,85,853
47	1,78,831	849							15,18,64,881	7,02,37,50,734
48	1,78,831	849							15,18,64,881	7,17,56,15,615
49	1,78,831	849							15,18,64,881	7,32,74,80,496
50	1,78,831	849							15,18,64,881	7,47,93,45,376
51	1,78,831	849							15,18,64,881	7,63,12,10,257
52	1,78,831	849							15,18,64,881	7,78,30,75,138
53	1,78,831	849							15,18,64,881	7,93,49,40,019
54	1,78,831	849							15,18,64,881	8,08,68,04,899
55	1,78,831	849							15,18,64,881	8,23,86,69,780
56	1,78,831	849							15,18,64,881	8,39,05,34,661
57	1,78,831	849							15,18,64,881	8,54,23,99,542
58	1,78,831	849							15,18,64,881	8,69,42,64,422
59	1,78,831	849							15,18,64,881	8,84,61,29,303
60	1,78,831	849							15,18,64,881	8,99,79,94,184
61	1,78,831	849							15,18,64,881	9,14,98,59,065
62	1,78,831	849							15,18,64,881	9,30,17,23,945
63	1,78,831	849							15,18,64,881	9,45,35,88,826
64	1,78,831	849							15,18,64,881	9,60,54,53,707
65	1,78,831	849							15,18,64,881	9,75,73,18,588
66	1,78,831	849							15,18,64,881	9,90,91,83,468
67	1,78,831	849							15,18,64,881	10,06,10,48,349
68	1,78,831	849							15,18,64,881	10,21,29,13,230
69	1,78,831	849							15,18,64,881	10,36,47,78,110
70	1,78,831	849							15,18,64,881	10,51,66,42,991
71	1,78,831	849							15,18,64,881	10,66,85,07,872
72	1,78,831	849							15,18,64,881	10,82,03,72,752
73	1,78,831	849							15,18,64,881	10,97,22,37,633
74	1,78,831	849							15,18,64,881	11,12,41,02,514
75	1,78,831	849							15,18,64,881	11,27,59,67,395
76	1,78,831	849							15,18,64,881	11,42,78,32,276
77	1,78,831	849							15,18,64,881	11,57,96,97,156
78	1,78,831	849							15,18,64,881	11,73,15,62,037
79	1,78,831	849							15,18,64,881	11,88,34,26,918
80	1,78,831	849							15,18,64,881	12,03,52,91,799
81	1,78,831	849							15,18,64,881	12,18,71,56,679
82	1,78,831	849							15,18,64,881	12,33,90,21,560
83	1,78,831	849							15,18,64,881	12,49,08,86,441
84	1,78,831	849							15,18,64,881	12,64,27,51,322
85	1,78,831	849							15,18,64,881	12,79,46,16,202
86	1,78,831	849							15,18,64,881	12,94,64,81,083
87	1,78,831	849							15,18,64,881	13,09,83,45,964
88	1,78,831	849							15,18,64,881	13,25,02,10,845
89	1,78,831	849							15,18,64,881	13,40,20,75,725
90	1,78,831	849							15,18,64,881	13,55,39,40,606
91	1,78,831	849							15,18,64,881	13,70,58,05,487
92	1,78,831	849							15,18,64,881	13,85,76,70,367
93	1,78,831	849							15,18,64,881	14,00,95,35,248
94	1,78,831	849							15,18,64,881	14,16,14,00,129
95	1,78,831	849							15,18,64,881	14,31,32,65,010
96	1,78,831	849							15,18,64,881	14,46,51,29,890
97	1,78,831	849							15,18,64,881	14,61,69,94,771
98	1,78,831	849							15,18,64,881	14,76,88,59,652
99	1,78,831	849							15,18,64,881	14,92,07,24,533
100	1,78,831	849							15,18,64,881	15,07,25,89,413
T										

Table 17: Annual areas deforested per forest class within the Project Area in the baseline case (activity data per forest class).

vity data per LU/LC category cl within the leakage					Total baseline deforestation in the leakage belt	
ABSLLK cl Name >	Dense Forest	Sparse Forest	...	Cl	ABSLLK annual	ABSLLK cumulative
Project year (t)	ha	ha	ha	ha	ha	ha
1	15,000				15,000	15,000
2	4,134				4,134	19,134
3	3,980				3,980	23,114
4	995				995	24,109
5	890				890	24,999
6	0				0	24,999
7	0				0	24,999
8	0				0	24,999
9	0				0	24,999
10	0				0	24,999
11	0				0	24,999
12	0				0	24,999
13	0				0	24,999
14	0				0	24,999
15	0				0	24,999
16	0				0	24,999
17	0				0	24,999
18	0				0	24,999
19	0				0	24,999
20	0				0	24,999
21	0				0	24,999
22	0				0	24,999
23	0				0	24,999
24	0				0	24,999
25	0				0	24,999
26	0				0	24,999
27	0				0	24,999
28	0				0	24,999
29	0				0	24,999
30	0				0	24,999
31	0				0	24,999
32	0				0	24,999
33	0				0	24,999
34	0				0	24,999
35	0				0	24,999
36	0				0	24,999
37	0				0	24,999
38	0				0	24,999
39	0				0	24,999
40	0				0	24,999
41	0				0	24,999
42	0				0	24,999
43	0				0	24,999
44	0				0	24,999
45	0				0	24,999
46	0				0	24,999
47	0				0	24,999
48	0				0	24,999
49	0				0	24,999
50	0				0	24,999
51	0				0	24,999
52	0				0	24,999
53	0				0	24,999
54	0				0	24,999
55	0				0	24,999
56	0				0	24,999
57	0				0	24,999
58	0				0	24,999
59	0				0	24,999
60	0				0	24,999
61	0				0	24,999
62	0				0	24,999
63	0				0	24,999
64	0				0	24,999
65	0				0	24,999
66	0				0	24,999
67	0				0	24,999
68	0				0	24,999
69	0				0	24,999
70	0				0	24,999
71	0				0	24,999
72	0				0	24,999
73	0				0	24,999
74	0				0	24,999
75	0				0	24,999
76	0				0	24,999
77	0				0	24,999
78	0				0	24,999
79	0				0	24,999
80	0				0	24,999
81	0				0	24,999
82	0				0	24,999
83	0				0	24,999
84	0				0	24,999
85	0				0	24,999
86	0				0	24,999
87	0				0	24,999
88	0				0	24,999
89	0				0	24,999
90	0				0	24,999
91	0				0	24,999
92	0				0	24,999
93	0				0	24,999
94	0				0	24,999
95	0				0	24,999
96	0				0	24,999
97	0				0	24,999
98	0				0	24,999
99	0				0	24,999
100	0				0	24,999
T						

Table 18: Annual areas deforested per forest class within the leakage belt in the baseline case (activity data per forest class).

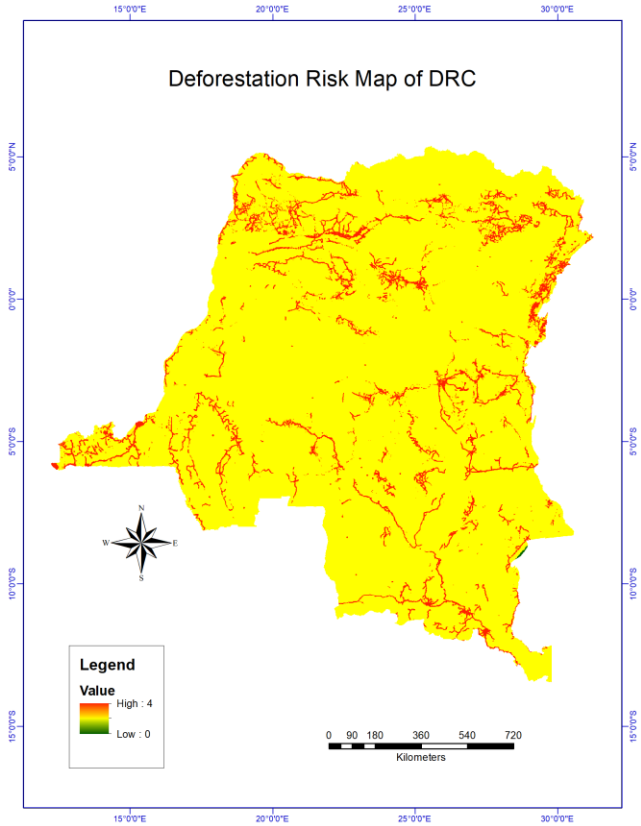

Figure # 14: Location of future deforestation risk in DRC.

5.2 Calculation of baseline activity data per post-deforestation forest class: In this step, there are two steps methods available, a. Historical LULC Change and b. Modeling. Since most of the works are carried out using modeling method project choose modeling method. The modeling method is further sub-divided into two a).The Projection of LU/LC-change categories, and b) Suitability modeling. The Option a) was preferred here and followed the step as described in the section 4.2.3 of the VM0015.

Project year (t)	Stratum 1 in the reference region	Stratum 2 in the reference region	...	...	Total	
	1 [illegible] ha	2 [illegible] ha	[illegible] ha	[illegible] ha	annual [illegible] ha	cumulative [illegible] ha
1	9,44,154	1,34,447			10,78,601	10,78,601
2	10,88,308	2,68,894			21,57,202	32,35,803
3	10,88,308	2,68,894			21,57,202	53,93,004
4	10,88,308	2,68,894			21,57,202	75,50,206
5	7,86,795	1,12,029			8,98,824	84,49,030
6	10,88,308	2,68,894			21,57,202	1,06,06,242
7	10,88,308	2,68,894			21,57,202	1,27,63,443
8	10,88,308	2,68,894			21,57,202	1,49,20,645
9	10,88,308	2,68,894			21,57,202	1,70,77,847
10	10,88,308	2,68,894			21,57,202	1,92,35,048
11	10,88,308	2,68,894			21,57,202	2,13,92,250
12	10,88,308	2,68,894			21,57,202	2,35,49,452
13	10,88,308	2,68,894			21,57,202	2,57,06,653
14	10,88,308	2,68,894			21,57,202	2,78,63,855
15	10,88,308	2,68,894			21,57,202	3,00,21,057
16	10,88,308	2,68,894			21,57,202	3,21,78,258
17	10,88,308	2,68,894			21,57,202	3,43,35,460
18	10,88,308	2,68,894			21,57,202	3,64,92,662
19	10,88,308	2,68,894			21,57,202	3,86,49,863
20	10,88,308	2,68,894			21,57,202	4,08,07,065
21	10,88,308	2,68,894			21,57,202	4,29,64,267
22	10,88,308	2,68,894			21,57,202	4,51,21,468
23	10,88,308	2,68,894			21,57,202	4,72,78,670
24	10,88,308	2,68,894			21,57,202	4,94,35,872
25	10,88,308	2,68,894			21,57,202	5,15,93,073
26	10,88,308	2,68,894			21,57,202	5,37,50,275
27	10,88,308	2,68,894			21,57,202	5,59,07,477
28	10,88,308	2,68,894			21,57,202	5,80,64,678
29	10,88,308	2,68,894			21,57,202	6,02,21,880
30	10,88,308	2,68,894			21,57,202	6,23,79,082
31	10,88,308	2,68,894			21,57,202	6,45,36,283
32	10,88,308	2,68,894			21,57,202	6,66,93,485
33	10,88,308	2,68,894			21,57,202	6,88,50,687
34	10,88,308	2,68,894			21,57,202	7,10,07,888
35	10,88,308	2,68,894			21,57,202	7,31,65,090
36	10,88,308	2,68,894			21,57,202	7,53,22,292
37	10,88,308	2,68,894			21,57,202	7,74,79,493
38	10,88,308	2,68,894			21,57,202	7,96,36,695
39	10,88,308	2,68,894			21,57,202	8,17,93,897
40	10,88,308	2,68,894			21,57,202	8,39,51,098
41	10,88,308	2,68,894			21,57,202	8,61,08,300
42	10,88,308	2,68,894			21,57,202	8,82,65,502
43	10,88,308	2,68,894			21,57,202	9,04,22,703
44	10,88,308	2,68,894			21,57,202	9,25,79,905
45	10,88,308	2,68,894			21,57,202	9,47,37,107
46	10,88,308	2,68,894			21,57,202	9,68,94,308
47	10,88,308	2,68,894			21,57,202	9,90,51,510
48	10,88,308	2,68,894			21,57,202	10,12,08,712
49	10,88,308	2,68,894			21,57,202	10,33,65,913
50	10,88,308	2,68,894			21,57,202	10,55,23,115
51	10,88,308	2,68,894			21,57,202	10,76,80,317
52	10,88,308	2,68,894			21,57,202	10,98,37,518
53	10,88,308	2,68,894			21,57,202	11,19,94,720
54	10,88,308	2,68,894			21,57,202	11,41,51,922
55	10,88,308	2,68,894			21,57,202	11,63,09,123
56	10,88,308	2,68,894			21,57,202	11,84,66,325
57	10,88,308	2,68,894			21,57,202	12,06,23,527
58	10,88,308	2,68,894			21,57,202	12,27,80,728
59	10,88,308	2,68,894			21,57,202	12,49,37,930
60	10,88,308	2,68,894			21,57,202	12,70,95,132
61	10,88,308	2,68,894			21,57,202	12,92,52,333
62	10,88,308	2,68,894			21,57,202	13,14,09,535
63	10,88,308	2,68,894			21,57,202	13,35,66,737
64	10,88,308	2,68,894			21,57,202	13,57,23,938
65	10,88,308	2,68,894			21,57,202	13,78,81,140
66	10,88,308	2,68,894			21,57,202	14,00,38,342
67	10,88,308	2,68,894			21,57,202	14,21,95,543
68	10,88,308	2,68,894			21,57,202	14,43,52,745
69	10,88,308	2,68,894			21,57,202	14,65,09,947
70	10,88,308	2,68,894			21,57,202	14,86,67,148
71	10,88,308	2,68,894			21,57,202	15,08,24,350
72	10,88,308	2,68,894			21,57,202	15,29,81,552
73	10,88,308	2,68,894			21,57,202	15,51,38,753
74	10,88,308	2,68,894			21,57,202	15,72,95,955
75	10,88,308	2,68,894			21,57,202	15,94,53,157
76	10,88,308	2,68,894			21,57,202	16,16,10,358
77	10,88,308	2,68,894			21,57,202	16,37,67,560
78	10,88,308	2,68,894			21,57,202	16,59,24,762
79	10,88,308	2,68,894			21,57,202	16,80,81,963
80	10,88,308	2,68,894			21,57,202	17,02,39,165
81	10,88,308	2,68,894			21,57,202	17,23,96,367
82	10,88,308	2,68,894			21,57,202	17,45,53,568
83	10,88,308	2,68,894			21,57,202	17,67,10,770
84	10,88,308	2,68,894			21,57,202	17,88,67,972
85	10,88,308	2,68,894			21,57,202	18,10,25,173
86	10,88,308	2,68,894			21,57,202	18,31,82,375
87	10,88,308	2,68,894			21,57,202	18,53,39,577
88	10,88,308	2,68,894			21,57,202	18,74,96,778
89	10,88,308	2,68,894			21,57,202	18,96,53,980
90	10,88,308	2,68,894			21,57,202	19,18,11,182
91	10,88,308	2,68,894			21,57,202	19,39,68,383
92	10,88,308	2,68,894			21,57,202	19,61,25,585
93	10,88,308	2,68,894			21,57,202	19,82,82,787
94	10,88,308	2,68,894			21,57,202	20,04,39,988
95	10,88,308	2,68,894			21,57,202	20,25,97,190
96	10,88,308	2,68,894			21,57,202	20,47,54,392
97	10,88,308	2,68,894			21,57,202	20,69,11,593
98	10,88,308	2,68,894			21,57,202	20,90,68,795
99	10,88,308	2,68,894			21,57,202	21,12,25,997
100	10,88,308	2,68,894			21,57,202	21,33,83,198
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Project year (t)	[illegible] of the reference region in the project		...	...	Total	
	Dense Forest [illegible] ha	Sparse Forest [illegible] ha	[illegible] ha	[illegible] ha	annual [illegible] ha	cumulative [illegible] ha
1	1,74,000	327			1,74,327	1,74,327
2	3,48,000	654			3,48,654	5,22,980
3	3,48,000	654			3,48,654	8,71,634
4	3,48,000	654			3,48,654	12,20,288
5	1,74,000	327			1,74,327	13,94,615
6	3,48,000	654			3,48,654	17,43,268
7	3,48,000	654			3,48,654	20,91,922
8	3,48,000	654			3,48,654	24,40,576
9	3,48,000	654			3,48,654	27,89,229
10	3,48,000	654			3,48,654	31,37,883
11	3,48,000	654			3,48,654	34,86,537
12	3,48,000	654			3,48,654	38,35,190
13	3,48,000	654			3,48,654	41,83,844
14	3,48,000	654			3,48,654	45,32,498
15	3,48,000	654			3,48,654	48,81,151
16	3,48,000	654			3,48,654	52,29,805
17	3,48,000	654			3,48,654	55,78,459
18	3,48,000	654			3,48,654	59,27,112
19	3,48,000	654			3,48,654	62,75,766
20	3,48,000	654			3,48,654	66,24,420
21	3,48,000	654			3,48,654	69,73,073
22	3,48,000	654			3,48,654	73,21,727
23	3,48,000	654			3,48,654	76,70,381
24	3,48,000	654			3,48,654	80,19,034
25	3,48,000	654			3,48,654	83,67,688
26	3,48,000	654			3,48,654	87,16,342
27	3,48,000	654			3,48,654	90,64,995
28	3,48,000	654			3,48,654	94,13,649
29	3,48,000	654			3,48,654	97,62,303
30	3,48,000	654			3,48,654	1,01,10,956
31	3,48,000	654			3,48,654	1,04,59,610
32	3,48,000	654			3,48,654	1,08,08,264
33	3,48,000	654			3,48,654	1,11,56,917
34	3,48,000	654			3,48,654	1,15,05,571
35	3,48,000	654			3,48,654	1,18,54,225
36	3,48,000	654			3,48,654	1,22,02,878
37	3,48,000	654			3,48,654	1,25,51,532
38	3,48,000	654			3,48,654	1,29,00,186
39	3,48,000	654			3,48,654	1,32,48,839
40	3,48,000	654			3,48,654	1,35,97,493
41	3,48,000	654			3,48,654	1,39,46,147
42	3,48,000	654			3,48,654	1,42,94,800
43	3,48,000	654			3,48,654	1,46,43,454
44	3,48,000	654			3,48,654	1,49,92,108
45	3,48,000	654			3,48,654	1,53,40,761
46	3,48,000	654			3,48,654	1,56,89,415
47	3,48,000	654			3,48,654	1,60,38,069
48	3,48,000	654			3,48,654	1,63,86,722
49	3,48,000	654			3,48,654	1,67,35,376
50	3,48,000	654			3,48,654	1,70,84,030
51	3,48,000	654			3,48,654	1,74,32,683
52	3,48,000	654			3,48,654	1,77,81,337
53	3,48,000	654			3,48,654	1,81,29,991
54	3,48,000	654			3,48,654	1,84,78,644
55	3,48,000	654			3,48,654	1,88,27,298
56	3,48,000	654			3,48,654	1,91,75,952
57	3,48,000	654			3,48,654	1,95,24,605
58	3,48,000	654			3,48,654	1,98,73,259
59	3,48,000	654			3,48,654	2,02,21,913
60	3,48,000	654			3,48,654	2,05,70,566
61	3,48,000	654			3,48,654	2,09,19,220
62	3,48,000	654			3,48,654	2,12,67,874
63	3,48,000	654			3,48,654	2,16,16,527
64	3,48,000	654			3,48,654	2,19,65,181
65	3,48,000	654			3,48,654	2,23,13,835
66	3,48,000	654			3,48,654	2,26,62,488
67	3,48,000	654			3,48,654	2,30,11,142
68	3,48,000	654			3,48,654	2,33,59,796
69	3,48,000	654			3,48,654	2,37,08,449
70	3,48,000	654			3,48,654	2,40,57,103
71	3,48,000	654			3,48,654	2,44,05,757
72	3,48,000	654			3,48,654	2,47,54,410
73	3,48,000	654			3,48,654	2,51,03,064
74	3,48,000	654			3,48,654	2,54,51,718
75	3,48,000	654			3,48,654	2,58,00,371
76	3,48,000	654			3,48,654	2,61,49,025
77	3,48,000	654			3,48,654	2,64,97,679
78	3,48,000	654			3,48,654	2,68,46,332
79	3,48,000	654			3,48,654	2,71,94,986
80	3,48,000	654			3,48,654	2,75,43,640
81	3,48,000	654			3,48,654	2,78,92,293
82	3,48,000	654			3,48,654	2,82,40,947
83	3,48,000	654			3,48,654	2,85,89,601
84	3,48,000	654			3,48,654	2,89,38,254
85	3,48,000	654			3,48,654	2,92,86,908
86	3,48,000	654			3,48,654	2,96,35,562
87	3,48,000	654			3,48,654	2,99,84,215
88	3,48,000	654			3,48,654	3,03,32,869
89	3,48,000	654			3,48,654	3,06,81,523
90	3,48,000	654			3,48,654	3,10,30,176
91	3,48,000	654			3,48,654	3,13,78,830
92	3,48,000	654			3,48,654	3,17,27,484
93	3,48,000	654			3,48,654	3,20,76,137
94	3,48,000	654			3,48,654	3,24,24,791
95	3,48,000	654			3,48,654	3,27,73,445
96	3,48,000	654			3,48,654	3,31,22,098
97	3,48,000	654			3,48,654	3,34,70,752
98	3,48,000	654			3,48,654	3,38,19,406
99	3,48,000	654			3,48,654	3,41,68,059
100	3,48,000	654			3,48,654	3,45,16,713
T						

Project year (t)	[illegible] of the reference region in the leakage		...	...	Total	
	Dense Forest [illegible] ha	Sparse Forest [illegible] ha	[illegible] ha	[illegible] ha	annual [illegible] ha	cumulative [illegible] ha
1	16,425	543			16,968	16,968
2	32,849	543			33,392	50,360
3	32,849	543			33,392	83,752
4	32,849	543			33,392	1,17,145
5	16,425	272			16,696	1,33,841
6	32,849	543			33,392	1,67,233
7	32,849	543			33,392	2,00,626
8	32,849	543			33,392	2,34,018
9	32,849	543			33,392	2,67,410
10	32,849	543			33,392	3,00,802
11	32,849	543			33,392	3,34,195
12	32,849	543			33,392	3,67,587
13	32,849	543			33,392	4,00,979
14	32,849	543			33,392	4,34,372
15	32,849	543			33,392	4,67,764
16	32,849	543			33,392	5,01,156
17	32,849	543			33,392	5,34,549
18	32,849	543			33,392	5,67,941
19	32,849	543			33,392	6,01,333
20	32,849	543			33,392	6,34,726
21	32,849	543			33,392	6,68,118
22	32,849	543			33,392	7,01,510
23	32,849	543			33,392	7,34,902
24	32,849	543			33,392	7,68,295
25	32,849	543			33,392	8,01,687
26	32,849	543			33,392	8,35,079
27	32,849	543			33,392	8,68,472
28	32,849	543			33,392	9,01,864
29	32,849	543			33,392	9,35,256
30	32,849	543			33,392	9,68,649
31	32,849	543			33,392	10,02,041
32	32,849	543			33,392	10,35,433
33	32,849	543			33,392	10,68,826
34	32,849	543			33,392	11,02,218
35	32,849	543			33,392	11,35,610
36	32,849	543			33,392	11,69,003
37	32,849	543			33,392	12,02,395
38	32,849	543			33,392	12,35,787
39	32,849	543			33,392	12,69,179
40	32,849	543			33,392	13,02,572
41	32,849	543			33,392	13,35,964
42	32,849	543			33,392	13,69,356
43	32,849	543			33,392	14,02,749
44	32,849	543			33,392	14,36,141
45	32,849	543			33,392	14,69,533
46	32,849	543			33,392	15,02,926
47	32,849	543			33,392	15,36,318
48	32,849	543			33,392	15,69,710
49	32,849	543			33,392	16,03,103
50	32,849	543			33,392	16,36,495
51	32,849	543			33,392	16,69,887
52	32,849	543			33,392	17,03,280
53	32,849	543			33,392	17,36,672
54	32,849	543			33,392	17,70,064
55	32,849	543			33,392	18,03,456
56	32,849	543			33,392	18,36,849
57	32,849	543			33,392	18,70,241
58	32,849	543			33,392	19,03,633
59	32,849	543			33,392	19,37,026
60	32,849	543			33,392	19,70,418
61	32,849	543			33,392	20,03,810
62	32,849	543			33,392	20,37,203
63	32,849	543			33,392	20,70,595
64	32,849	543			33,392	21,03,987
65	32,849	543			33,392	21,37,380
66	32,849	543			33,392	21,70,772
67	32,849	543			33,392	22,04,164
68	32,849	543			33,392	22,37,557
69	32,849	543			33,392	22,70,949
70	32,849	543			33,392	23,04,341
71	32,849	543			33,392	23,37,733
72	32,849	543			33,392	23,71,126
73	32,849	543			33,392	24,04,518
74	32,849	543			33,392	24,37,910
75	32,849	543			33,392	24,71,303
76	32,849	543			33,392	25,04,695
77	32,849	543			33,392	25,38,087
78	32,849	543			33,392	25,71,480
79	32,849	543			33,392	26,04,872
80	32,849	543			33,392	26,38,264
81	32,849	543			33,392	26,71,657
82	32,849	543			33,392	27,05,049
83	32,849	543			33,392	27,38,441
84	32,849	543			33,392	27,71,834
85	32,849	543			33,392	28,05,226
86	32,849	543			33,392	28,38,618
87	32,849	543			33,392	28,72,010
88	32,849	543			33,392	29,05,403
89	32,849	543			33,392	29,38,795
90	32,849	543			33,392	29,72,187
91	32,849	543			33,392	30,05,580
92	32,849	543			33,392	30,38,972
93	32,849	543			33,392	30,72,364
94	32,849	543			33,392	31,05,757
95	32,849	543			33,392	31,39,149
96	32,849	543			33,392	31,72,541
97	32,849	543			33,392	32,05,934
98	32,849	543			33,392	32,39,326
99	32,849	543			33,392	32,72,718
100	32,849	543			33,392	33,06,111
T						

Table 19: Annual areas deforested in each zone within the reference region in the baseline case (baseline activity data per zone).

In this step, there are two steps methods available, a. Historical LULC Change and b. Modeling. Since most of the works are carried out using modeling method project choose modeling method. The modeling method is further sub-divided into two a). Projection of LULC categories, and b) Suitability modeling. The Option a) was preferred here and followed the step as described in the section 4.2.3 of the VM0015.

5.3 Calculation of baseline activity data per LU/LC change category

This step was carried out as the project mapped the areas of deforestation. The goal of this sub-step is to identify the categories of LU/LC-change (ct) and the level of activity data of each of these categories. The map showing the future year deforestation i.e., step 4.2.4 the map of post-deforestation LU/LC classes (fcl) prepared. The summary of the results are found in the following table:

Project year t	Dense Forest ha	Sparse Forest ha	... ha	fcl ha	Total baseline deforestation in the project area ANSLUK annual ha	ANSLUK cumulative ha
1	9,44,154	1,34,447			10,78,601	10,78,601
2	10,88,288	2,68,394			21,57,202	32,35,802
3	10,88,288	2,68,394			21,57,202	53,93,004
4	10,88,288	2,68,394			21,57,202	75,50,206
5	9,44,154	1,34,447			10,78,601	86,28,807
6	10,88,288	2,68,394			21,57,202	1,07,86,008
7	10,88,288	2,68,394			21,57,202	1,29,43,210
8	10,88,288	2,68,394			21,57,202	1,51,00,412
9	10,88,288	2,68,394			21,57,202	1,72,57,613
10	10,88,288	2,68,394			21,57,202	1,94,14,815
11	10,88,288	2,68,394			21,57,202	2,15,72,017
12	10,88,288	2,68,394			21,57,202	2,37,29,218
13	10,88,288	2,68,394			21,57,202	2,58,86,420
14	10,88,288	2,68,394			21,57,202	2,80,43,622
15	10,88,288	2,68,394			21,57,202	3,02,00,823
16	10,88,288	2,68,394			21,57,202	3,23,58,025
17	10,88,288	2,68,394			21,57,202	3,45,15,227
18	10,88,288	2,68,394			21,57,202	3,66,72,428
19	10,88,288	2,68,394			21,57,202	3,88,29,630
20	10,88,288	2,68,394			21,57,202	4,09,86,832
21	10,88,288	2,68,394			21,57,202	4,31,44,033
22	10,88,288	2,68,394			21,57,202	4,53,01,235
23	10,88,288	2,68,394			21,57,202	4,74,58,437
24	10,88,288	2,68,394			21,57,202	4,96,15,638
25	10,88,288	2,68,394			21,57,202	5,17,72,840
26	10,88,288	2,68,394			21,57,202	5,39,30,042
27	10,88,288	2,68,394			21,57,202	5,60,87,243
28	10,88,288	2,68,394			21,57,202	5,82,44,445
29	10,88,288	2,68,394			21,57,202	6,04,01,647
30	10,88,288	2,68,394			21,57,202	6,25,58,848
31	10,88,288	2,68,394			21,57,202	6,47,16,050
32	10,88,288	2,68,394			21,57,202	6,68,73,252
33	10,88,288	2,68,394			21,57,202	6,90,30,453
34	10,88,288	2,68,394			21,57,202	7,11,87,655
35	10,88,288	2,68,394			21,57,202	7,33,44,857
36	10,88,288	2,68,394			21,57,202	7,55,02,059
37	10,88,288	2,68,394			21,57,202	7,76,59,260
38	10,88,288	2,68,394			21,57,202	7,98,16,462
39	10,88,288	2,68,394			21,57,202	8,19,73,664
40	10,88,288	2,68,394			21,57,202	8,41,30,865
41	10,88,288	2,68,394			21,57,202	8,62,88,067
42	10,88,288	2,68,394			21,57,202	8,84,45,268
43	10,88,288	2,68,394			21,57,202	9,06,02,470
44	10,88,288	2,68,394			21,57,202	9,27,59,672
45	10,88,288	2,68,394			21,57,202	9,49,16,873
46	10,88,288	2,68,394			21,57,202	9,70,74,075
47	10,88,288	2,68,394			21,57,202	9,92,31,277
48	10,88,288	2,68,394			21,57,202	10,13,88,478
49	10,88,288	2,68,394			21,57,202	10,35,45,680
50	10,88,288	2,68,394			21,57,202	10,57,02,882
51	10,88,288	2,68,394			21,57,202	10,78,60,083
52	10,88,288	2,68,394			21,57,202	11,00,17,285
53	10,88,288	2,68,394			21,57,202	11,21,74,487
54	10,88,288	2,68,394			21,57,202	11,43,31,688
55	10,88,288	2,68,394			21,57,202	11,64,88,890
56	10,88,288	2,68,394			21,57,202	11,86,46,092
57	10,88,288	2,68,394			21,57,202	12,08,03,293
58	10,88,288	2,68,394			21,57,202	12,29,60,495
59	10,88,288	2,68,394			21,57,202	12,51,17,697
60	10,88,288	2,68,394			21,57,202	12,72,74,898
61	10,88,288	2,68,394			21,57,202	12,94,32,100
62	10,88,288	2,68,394			21,57,202	13,15,89,302
63	10,88,288	2,68,394			21,57,202	13,37,46,503
64	10,88,288	2,68,394			21,57,202	13,59,03,705
65	10,88,288	2,68,394			21,57,202	13,80,60,907
66	10,88,288	2,68,394			21,57,202	14,02,18,108
67	10,88,288	2,68,394			21,57,202	14,23,75,310
68	10,88,288	2,68,394			21,57,202	14,45,32,512
69	10,88,288	2,68,394			21,57,202	14,66,89,713
70	10,88,288	2,68,394			21,57,202	14,88,46,915
71	10,88,288	2,68,394			21,57,202	15,10,04,117
72	10,88,288	2,68,394			21,57,202	15,31,61,318
73	10,88,288	2,68,394			21,57,202	15,53,18,520
74	10,88,288	2,68,394			21,57,202	15,74,75,722
75	10,88,288	2,68,394			21,57,202	15,96,32,923
76	10,88,288	2,68,394			21,57,202	16,17,90,125
77	10,88,288	2,68,394			21,57,202	16,39,47,327
78	10,88,288	2,68,394			21,57,202	16,61,04,528
79	10,88,288	2,68,394			21,57,202	16,82,61,730
80	10,88,288	2,68,394			21,57,202	17,04,18,932
81	10,88,288	2,68,394			21,57,202	17,25,76,133
82	10,88,288	2,68,394			21,57,202	17,47,33,335
83	10,88,288	2,68,394			21,57,202	17,68,90,537
84	10,88,288	2,68,394			21,57,202	17,90,47,738
85	10,88,288	2,68,394			21,57,202	18,12,04,940
86	10,88,288	2,68,394			21,57,202	18,33,62,142
87	10,88,288	2,68,394			21,57,202	18,55,19,343
88	10,88,288	2,68,394			21,57,202	18,76,76,545
89	10,88,288	2,68,394			21,57,202	18,98,33,747
90	10,88,288	2,68,394			21,57,202	19,19,90,948
91	10,88,288	2,68,394			21,57,202	19,41,48,150
92	10,88,288	2,68,394			21,57,202	19,63,05,352
93	10,88,288	2,68,394			21,57,202	19,84,62,553
94	10,88,288	2,68,394			21,57,202	20,06,19,755
95	10,88,288	2,68,394			21,57,202	20,27,76,957
96	10,88,288	2,68,394			21,57,202	20,49,34,158
97	10,88,288	2,68,394			21,57,202	20,70,91,360
98	10,88,288	2,68,394			21,57,202	20,92,48,562
99	10,88,288	2,68,394			21,57,202	21,14,05,763
100	10,88,288	2,68,394			21,57,202	21,35,62,965
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Project year t	Dense Forest ha	Sparse Forest ha	... ha	fcl ha	Total baseline deforestation in the project area ANSLU annual ha	ANSLU cumulative ha
1	1,74,000	327			1,74,327	1,74,327
2	3,48,000	654			3,48,654	5,22,980
3	3,48,000	654			3,48,654	8,71,634
4	3,48,000	654			3,48,654	12,20,288
5	1,74,000	327			1,74,327	13,94,615
6	3,48,000	654			3,48,654	17,43,268
7	3,48,000	654			3,48,654	20,91,922
8	3,48,000	654			3,48,654	24,40,576
9	3,48,000	654			3,48,654	27,89,229
10	3,48,000	654			3,48,654	31,37,883
11	3,48,000	654			3,48,654	34,86,537
12	3,48,000	654			3,48,654	38,35,190
13	3,48,000	654			3,48,654	41,83,844
14	3,48,000	654			3,48,654	45,32,498
15	3,48,000	654			3,48,654	48,81,151
16	3,48,000	654			3,48,654	52,29,805
17	3,48,000	654			3,48,654	55,78,459
18	3,48,000	654			3,48,654	59,27,112
19	3,48,000	654			3,48,654	62,75,766
20	3,48,000	654			3,48,654	66,24,420
21	3,48,000	654			3,48,654	69,73,073
22	3,48,000	654			3,48,654	73,21,727
23	3,48,000	654			3,48,654	76,70,381
24	3,48,000	654			3,48,654	80,19,034
25	3,48,000	654			3,48,654	83,67,688
26	3,48,000	654			3,48,654	87,16,342
27	3,48,000	654			3,48,654	90,64,995
28	3,48,000	654			3,48,654	94,13,649
29	3,48,000	654			3,48,654	97,62,303
30	3,48,000	654			3,48,654	1,01,10,956
31	3,48,000	654			3,48,654	1,04,59,610
32	3,48,000	654			3,48,654	1,08,08,264
33	3,48,000	654			3,48,654	1,11,56,917
34	3,48,000	654			3,48,654	1,15,05,571
35	3,48,000	654			3,48,654	1,18,54,225
36	3,48,000	654			3,48,654	1,22,02,878
37	3,48,000	654			3,48,654	1,25,51,532
38	3,48,000	654			3,48,654	1,29,00,186
39	3,48,000	654			3,48,654	1,32,48,839
40	3,48,000	654			3,48,654	1,35,97,493
41	3,48,000	654			3,48,654	1,39,46,147
42	3,48,000	654			3,48,654	1,42,94,800
43	3,48,000	654			3,48,654	1,46,43,454
44	3,48,000	654			3,48,654	1,49,92,108
45	3,48,000	654			3,48,654	1,53,40,761
46	3,48,000	654			3,48,654	1,56,89,415
47	3,48,000	654			3,48,654	1,60,38,069
48	3,48,000	654			3,48,654	1,63,86,722
49	3,48,000	654			3,48,654	1,67,35,376
50	3,48,000	654			3,48,654	1,70,84,030
51	3,48,000	654			3,48,654	1,74,32,683
52	3,48,000	654			3,48,654	1,77,81,337
53	3,48,000	654			3,48,654	1,81,29,991
54	3,48,000	654			3,48,654	1,84,78,644
55	3,48,000	654			3,48,654	1,88,27,298
56	3,48,000	654			3,48,654	1,91,75,952
57	3,48,000	654			3,48,654	1,95,24,605
58	3,48,000	654			3,48,654	1,98,73,259
59	3,48,000	654			3,48,654	2,02,21,912
60	3,48,000	654			3,48,654	2,05,70,566
61	3,48,000	654			3,48,654	2,09,19,220
62	3,48,000	654			3,48,654	2,12,67,874
63	3,48,000	654			3,48,654	2,16,16,527
64	3,48,000	654			3,48,654	2,19,65,181
65	3,48,000	654			3,48,654	2,23,13,835
66	3,48,000	654			3,48,654	2,26,62,488
67	3,48,000	654			3,48,654	2,30,11,142
68	3,48,000	654			3,48,654	2,33,59,796
69	3,48,000	654			3,48,654	2,37,08,449
70	3,48,000	654			3,48,654	2,40,57,103
71	3,48,000	654			3,48,654	2,44,05,757
72	3,48,000	654			3,48,654	2,47,54,410
73	3,48,000	654			3,48,654	2,51,03,064
74	3,48,000	654			3,48,654	2,54,51,718
75	3,48,000	654			3,48,654	2,58,00,371
76	3,48,000	654			3,48,654	2,61,49,025
77	3,48,000	654			3,48,654	2,64,97,679
78	3,48,000	654			3,48,654	2,68,46,332
79	3,48,000	654			3,48,654	2,71,94,986
80	3,48,000	654			3,48,654	2,75,43,640
81	3,48,000	654			3,48,654	2,78,92,293
82	3,48,000	654			3,48,654	2,82,40,947
83	3,48,000	654			3,48,654	2,85,89,601
84	3,48,000	654			3,48,654	2,89,38,254
85	3,48,000	654			3,48,654	2,92,86,908
86	3,48,000	654			3,48,654	2,96,35,562
87	3,48,000	654			3,48,654	2,99,84,215
88	3,48,000	654			3,48,654	3,03,32,869
89	3,48,000	654			3,48,654	3,06,81,523
90	3,48,000	654			3,48,654	3,10,30,176
91	3,48,000	654			3,48,654	3,13,78,830
92	3,48,000	654			3,48,654	3,17,27,484
93	3,48,000	654			3,48,654	3,20,76,137
94	3,48,000	654			3,48,654	3,24,24,791
95	3,48,000	654			3,48,654	3,27,73,445
96	3,48,000	654			3,48,654	3,31,22,098
97	3,48,000	654			3,48,654	3,34,70,752
98	3,48,000	654			3,48,654	3,38,19,406
99	3,48,000	654			3,48,654	3,41,68,059
100	3,48,000	654			3,48,654	3,45,16,713
T						

Project year t	Dense Forest ha	Sparse Forest ha	... ha	fcl ha	Total baseline deforestation in the project area ANSLUK annual ha	ANSLUK cumulative ha
1	670	133			804	804
2	1,341	267			1,607	2,411
3	1,341	267			1,607	4,018
4	1,341	267			1,607	5,626
5	670	133			804	6,429
6	1,341	267			1,607	8,036
7	1,341	267			1,607	9,644
8	1,341	267			1,607	11,251
9	1,341	267			1,607	12,858
10	1,341	267			1,607	14,466
11	1,341	267			1,607	16,073
12	1,341	267			1,607	17,680
13	1,341	267			1,607	19,287
14	1,341	267			1,607	20,895
15	1,341	267			1,607	22,502
16	1,341	267			1,607	24,109
17	1,341	267			1,607	25,717
18	1,341	267			1,607	27,324
19	1,341	267			1,607	28,931
20	1,341	267			1,607	30,539
21	1,341	267			1,607	32,146
22	1,341	267			1,607	33,753
23	1,341	267			1,607	35,360
24	1,341	267			1,607	36,968
25	1,341	267			1,607	38,575
26	1,341	267			1,607	40,182
27	1,341	267			1,607	41,790
28	1,341	267			1,607	43,397
29	1,341	267			1,607	45,004
30	1,341	267			1,607	46,611
31	1,341	267			1,607	48,219
32	1,341	267			1,607	49,826
33	1,341	267			1,607	51,433
34	1,341	267			1,607	53,041
35	1,341	267			1,607	54,648
36	1,341	267			1,607	56,255
37	1,341	267			1,607	57,862
38	1,341	267			1,607	59,470
39	1,341	267			1,607	61,077
40	1,341	267			1,607	62,684
41	1,341	267			1,607	64,292
42	1,341	267			1,607	65,899
43	1,341	267			1,607	67,506
44	1,341	267			1,607	69,113
45	1,341	267			1,607	70,721
46	1,341	267			1,607	72,328
47	1,341	267			1,607	73,935
48	1,341	267			1,607	75,542
49	1,341	267			1,607	77,150
50	1,341	267			1,607	78,757
51	1,341	267			1,607	80,365
52	1,341	267			1,607	81,972
53	1,341	267			1,607	83,579
54	1,341	267			1,607	85,186
55	1,341	267			1,607	86,794
56	1,341	267			1,607	88,401
57	1,341	267			1,607	90,008
58	1,341	267			1,607	91,616
59	1,341	267			1,607	93,223
60	1,341	267			1,607	94,830
61	1,341	267			1,607	96,437
62	1,341	267			1,607	98,045
63	1,341	267			1,607	99,652
64	1,341	267			1,607	1,01,259
65	1,341	267			1,607	1,02,867
66	1,341	267			1,607	1,04,474
67	1,341	267			1,607	1,06,081
68	1,341	267			1,607	1,07,688
69	1,341	267			1,607	1,09,296
70	1,341	267			1,607	1,10,903
71	1,341	267			1,607	1,12,510
72	1,341	267			1,607	1,14,118
73	1,341	267			1,607	1,15,725
74	1,341	267			1,607	1,17,332
75	1,341	267			1,607	1,18,939
76	1,341	267			1,607	1,20,547
77	1,341	267			1,607	1,22,154
78	1,341	267			1,607	1,23,761
79	1,341	267			1,607	1,25,369
80	1,341	267			1,607	1,26,976
81	1,341	267			1,607	1,28,583
82	1,341	267			1,607	1,30,190
83	1,341	267			1,607	1,31,798
84	1,341	267			1,607	1,33,405
85	1,341	267			1,607	1,35,012
86	1,341	267			1,607	1,36,620
87	1,341	267			1,607	1,38,227
88	1,341	267			1,607	1,39,834
89	1,341	267			1,607	1,41,442
90	1,341	267			1,607	1,43,049
91	1,341	267			1,607	1,44,656
92	1,341	267			1,607	1,46,263
93	1,341	267			1,607	1,47,871
94	1,341	267			1,607	1,49,478
95	1,341	267			1,607	1,51,085
96	1,341	267			1,607	1,52,693
97	1,341	267			1,607	1,54,300
98	1,341	267			1,607	1,55,907
99	1,341	267			1,607	1,57,514
100	1,341	267			1,607	1,59,122
T						

Project year t	Dense Forest ha	Sparse Forest ha	... ha	fcl ha	Total baseline deforestation in the project area ANSLUK annual ha	ANSLUK cumulative ha
1	15,754	138			15,893	15,893
2	31,508	277			31,785	47,678
3	31,508	277			31,785	79,463
4	31,508	277			31,785	1,11,248
5	15,754	138			15,893	1,27,140
6	31,508	277			31,785	1,58,925
7	31,508	277			31,785	1,90,710
8	31,508	277			31,785	2,22,495
9	31,508	277			31,785	2,54,280
10	31,508	277			31,785	2,86,065
11	31,508	277			31,785	3,17,850
12	31,508	277			31,785	3,49,635
13	31,508	277			31,785	3,81,420
14	31,508	277			31,785	4,13,205
15	31,508	277			31,785	4,44,990
16	31,508	277			31,785	4,76,775
17	31,508	277			31,785	5,08,560
18	31,508	277			31,785	5,40,345
19	31,508	277			31,785	5,72,130
20	31,508	277			31,785	6,03,915
21	31,508	277			31,785	6,35,700
22	31,508	277			31,785	6,67,485
23	31,508	277			31,785	6,99,270
24	31,508	277			31,785	7,31,056
25	31,508	277			31,785	7,62,841
26	31,508	277			31,785	7,94,626
27	31,508	277			31,785	8,26,411
28	31,508	277			31,785	8,58,196
29	31,508	277			31,785	8,89,981
30	31,508	277			31,785	9,21,765
31	31,508	277			31,785	9,53,550
32	31,508	277			31,785	9,85,335
33	31,508	277			31,785	10,17,121
34	31,508	277			31,785	10,48,906
35	31,508	277			31,785	10,80,691
36	31,508	277			31,785	11,12,476
37	31,508	277			31,785	11,44,261
38	31,508	277			31,785	11,76,046
39	31,508	277			31,785	12,07,831
40	31,508	277			31,785	12,39,616
41	31,508	277			31,785	12,71,401
42	31,508	277			31,785	13,03,186
43	31,508	277			31,785	13,34,971
44	31,508	277			31,785	13,66,756
45	31,508	277			31,785	13,98,541
46	31,508	277			31,785	14,30,326
47	31,508	277			31,785	14,62,111
48	31,508	277			31,785	14,93,896
49	31,508	277			31,785	15,25,681
50	31,508	277			31,785	15,57,466
51	31,508	277			31,785	15,89,251
52	31,508	277			31,785	16,21,036
53	31,508	277			31,785	16,52,821
54	31,508	277			31,785	16,84,606
55	31,508	277			31,785	17,16,391
56	31,508	277			31,785	17,48,176
57	31,508	277			31,785	17,79,961
58	31,508	277			31,785	18,11,746
59	31,508	277			31,785	18,43,531
60	31,508	277			31,785	18,75,316
61	31,508	277			31,785	19,07,101
62	31,508	277			31,785	19,38,886
63	31,508	277			31,785	19,70,671
64	31,508	277			31,785	20,02,456
65	31,508	277			31,785	20,34,241
66	31,508	277			31,785	20,66,026
67	31,508	277			31,785	20,97,811
68	31,508	277			31,785	21,29,596
69	31,508	277			31,785	21,61,381
70	31,508	277			31,785	21,93,167
71	31,508	277			31,785	22,24,952
72	31,508	277			31,785	22,56,737
73	31,508	277			31,785	22,88,522
74	31,508	277			31,785	23,20,307
75	31,508	277			31,785	23,52,092
76	31,508	277			31,785	23,83,877
77	31,508	277			31,785	24,15,662
78	31,508	277			31,785	24,47,447
79	31,508	277			31,785	24,79,232
80	31,508	277			31,785	25,11,017
81	31,508	277			31,785	25,42,802
82	31,508	277			31,785	25,74,587
83	31,508	277			31,785	26,06,372
84	31,508	277			31,785	26,38,157
85	31,508	277			31,785	26,69,942
86	31,508	277			31,785	27,01,727
87	31,508	277			31,785	27,33,512
88	31,508	277			31,785	27,65,297
89	31,508	277			31,785	27,97,082
90	31,508	277			31,785	28,28,867
91	31,508	277			31,785	28,60,652
92	31,508	277			31,785	28,92,437
93	31,508	277			31,785	29,24,222
94	31,508	277			31,785	29,56,007
95	31,508	277			31,785	29,87,792
96	31,508	277			31,785	30,19,577
97	31,508	277			31,785	30,51,362
98	31,508	277			31,785	30,83,147
99	31,508	277			31,785	31,14,932
100	31,508	277			31,785	31,46,717
T						

Table 20: Annual areas deforested in each zone within the reference region in the baseline case (baseline activity data per zone)

6.0 Estimation of baseline carbon stock changes

In line with the requirement of step 6, the goal of this step is to finalise the baseline assessment by calculating the a). Baseline carbon stock changes, and b). Baseline non-CO_2 emissions from forest fires used to clear the forests. The annual stock were estimated using the Harmonised Carbon density maps obtained from the Google earth engine (Spawn et all 2010) as stated by the VM0015 methodology, option a). The dataset referenced satisfy all the conditions required by the methodology. These were estimated for all the regions a) Reference region, b) Project area, and c) Leakage management area for the both Dense Forest and Sparse Forest classes (GOFC GOLD Source book and Gillespie et all., 1992). The carbon stock of post-deforestation classes was estimated as the long-term (20 years) average carbon stock and can be determined from measurements in plots of known age, long-term studies and other verifiable sources. For this, 69 stratified random samples were drawn using the Qgis software. V2.14.9. For each of the estimated random sample points a 30m round plot was created to estimate the dbh of the trees, shrubs and lianas.

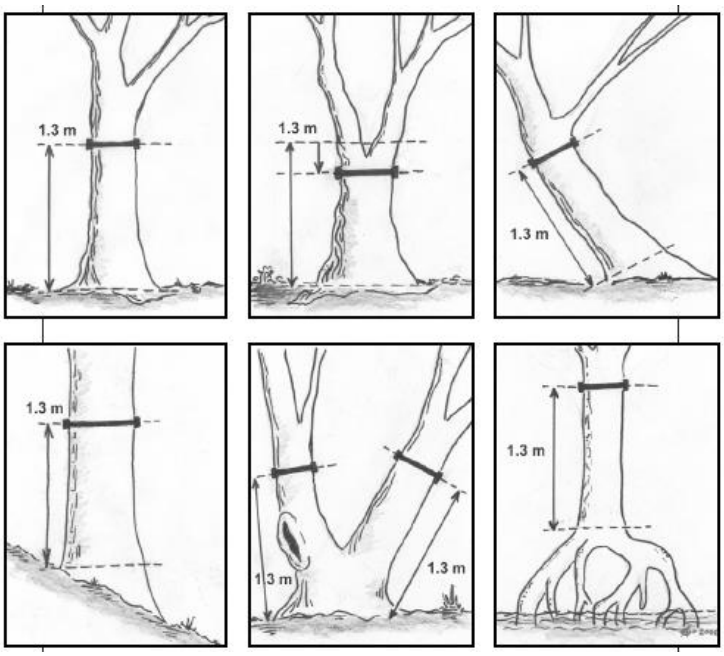

Figure #15: Dbh measurement locations for irregular and normally shaped trees.

Lying dead wood is most efficiently measured using the line-intersect method. Only coarse dead wood (wood with a diameter > 10cm) was measured as stated in VM0015.

Forest Floor (Litter Layer): The forest floor, or litter layer, is all dead organic surface material present on top of the soil. Some of this material will still be recognisable (for example, dead leaves, twigs, dead grasses and small branches) and some will be unidentifiable decomposed fragments of organic material. The dead wood with a diameter of less than 10cm is included in the litter layer. To estimate a square frame (30cm x 30 cm) made from PVC pipe was placed at the sample site and collected all the litter inside. The sample was weighed on-site, then oven-dry to a constant weight to estimate the biomass.

Calculation of baseline carbon stock changes (6.1.2 VM0015). Finally, the method 2 in step 6.1.2 in VM0015 was used to calculate changes in carbon stocks. The carbon stock of degraded rainforest was obtained through biomass inventory conducted by the project team. Estimation of baseline carbon stock changes are shown in the tables extracted from the calculation sheets.

Project year (t)	Carbon stock changes in initial (pre-deforestation) forest classes								Total C stock change in initial forest classes	
	ID_{icl} Dense For		ID_{icl} Sparse Fo		ID_{icl} ...		ID_{icl} - icl		annual	cumulative
	$ABSLRR_{icl,t}$	$Ctot_{icl,t}$	$ABSLRR_{icl,t}$	$Ctot_{icl,t}$	$ABSLRR_{icl,t}$	$Ctot_{icl,t}$	$ABSLRR_{icl,t}$	$Ctot_{icl,t}$	$\Delta CBSLRRi_{t}$	$\Delta CBSLRRi$
	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	tCO_2-e	tCO_2-e
1	9,44,154	997							94,16,51,857	94,16,51,857
2	18,88,308	997							1,88,33,03,715	2,82,49,55,572
3	18,88,308	997							1,88,33,03,715	4,70,82,59,286
4	18,88,308	997							1,88,33,03,715	6,59,15,63,001
5	9,44,154	997							94,16,51,857	7,53,32,14,858
6	18,88,308	997							1,88,33,03,715	9,41,65,18,573
7	18,88,308	997							1,88,33,03,715	11,29,98,22,287
8	18,88,308	997							1,88,33,03,715	13,18,31,26,002
9	18,88,308	997							1,88,33,03,715	15,06,64,29,716
10	18,88,308	997							1,88,33,03,715	16,94,97,33,431
11	18,88,308	997							1,88,33,03,715	18,83,30,37,145
12	18,88,308	997							1,88,33,03,715	20,71,63,40,860
13	18,88,308	997							1,88,33,03,715	22,59,96,44,574
14	18,88,308	997							1,88,33,03,715	24,48,29,48,289
15	18,88,308	997							1,88,33,03,715	26,36,62,52,003
16	18,88,308	997							1,88,33,03,715	28,24,95,55,718
17	18,88,308	997							1,88,33,03,715	30,13,28,59,432
18	18,88,308	997							1,88,33,03,715	32,01,61,63,147
19	18,88,308	997							1,88,33,03,715	33,89,94,66,861
20	18,88,308	997							1,88,33,03,715	35,78,27,70,576
21	18,88,308	997							1,88,33,03,715	37,66,60,74,290
22	18,88,308	997							1,88,33,03,715	39,54,93,78,005
23	18,88,308	997							1,88,33,03,715	41,43,26,81,719
24	18,88,308	997							1,88,33,03,715	43,31,59,85,434
25	18,88,308	997							1,88,33,03,715	45,19,92,89,148
26	18,88,308	997							1,88,33,03,715	47,08,25,92,863
27	18,88,308	997							1,88,33,03,715	48,96,58,96,577
28	18,88,308	997							1,88,33,03,715	50,84,92,00,292
29	18,88,308	997							1,88,33,03,715	52,73,25,04,006
30	18,88,308	997							1,88,33,03,715	54,61,58,07,721
31	18,88,308	997							1,88,33,03,715	56,49,91,11,435
32	18,88,308	997							1,88,33,03,715	58,38,24,15,150
33	18,88,308	997							1,88,33,03,715	60,26,57,18,864
34	18,88,308	997							1,88,33,03,715	62,14,90,22,579
35	18,88,308	997							1,88,33,03,715	64,03,23,26,294
36	18,88,308	997							1,88,33,03,715	65,91,56,30,008
37	18,88,308	997							1,88,33,03,715	67,79,89,33,723
38	18,88,308	997							1,88,33,03,715	69,68,22,37,437
39	18,88,308	997							1,88,33,03,715	71,56,55,41,152
40	18,88,308	997							1,88,33,03,715	73,44,88,44,866
41	18,88,308	997							1,88,33,03,715	75,33,21,48,581
42	18,88,308	997							1,88,33,03,715	77,21,54,52,295
43	18,88,308	997							1,88,33,03,715	79,09,87,56,010
44	18,88,308	997							1,88,33,03,715	80,98,20,59,724
45	18,88,308	997							1,88,33,03,715	82,86,53,63,439
46	18,88,308	997							1,88,33,03,715	84,74,86,67,153
47	18,88,308	997							1,88,33,03,715	86,63,19,70,868
48	18,88,308	997							1,88,33,03,715	88,51,52,74,582
49	18,88,308	997							1,88,33,03,715	90,39,85,78,297
50	18,88,308	997							1,88,33,03,715	92,28,18,82,011
51	18,88,308	997							1,88,33,03,715	94,16,51,85,726
52	18,88,308	997							1,88,33,03,715	96,04,84,89,440
53	18,88,308	997							1,88,33,03,715	97,93,17,93,155
54	18,88,308	997							1,88,33,03,715	99,81,50,96,869
55	18,88,308	997							1,88,33,03,715	1,01,69,84,00,584
56	18,88,308	997							1,88,33,03,715	1,03,58,17,04,298
57	18,88,308	997							1,88,33,03,715	1,05,46,50,08,013
58	18,88,308	997							1,88,33,03,715	1,07,34,83,11,727
59	18,88,308	997							1,88,33,03,715	1,09,23,16,15,442
60	18,88,308	997							1,88,33,03,715	1,11,11,49,19,156
61	18,88,308	997							1,88,33,03,715	1,12,99,82,22,871
62	18,88,308	997							1,88,33,03,715	1,14,88,15,26,585
63	18,88,308	997							1,88,33,03,715	1,16,76,48,30,300
64	18,88,308	997							1,88,33,03,715	1,18,64,81,34,014
65	18,88,308	997							1,88,33,03,715	1,20,53,14,37,729
66	18,88,308	997							1,88,33,03,715	1,22,41,47,41,444
67	18,88,308	997							1,88,33,03,715	1,24,29,80,45,158
68	18,88,308	997							1,88,33,03,715	1,26,18,13,48,873
69	18,88,308	997							1,88,33,03,715	1,28,06,46,52,587
70	18,88,308	997							1,88,33,03,715	1,29,94,79,56,302
71	18,88,308	997							1,88,33,03,715	1,31,83,12,60,016
72	18,88,308	997							1,88,33,03,715	1,33,71,45,63,731
73	18,88,308	997							1,88,33,03,715	1,35,59,78,67,445
74	18,88,308	997							1,88,33,03,715	1,37,48,11,71,160
75	18,88,308	997							1,88,33,03,715	1,39,36,44,74,874
76	18,88,308	997							1,88,33,03,715	1,41,24,77,78,589
77	18,88,308	997							1,88,33,03,715	1,43,13,10,82,303
78	18,88,308	997							1,88,33,03,715	1,45,01,43,86,018
79	18,88,308	997							1,88,33,03,715	1,46,89,76,89,732
80	18,88,308	997							1,88,33,03,715	1,48,78,09,93,447
81	18,88,308	997							1,88,33,03,715	1,50,66,42,97,161
82	18,88,308	997							1,88,33,03,715	1,52,54,76,00,876
83	18,88,308	997							1,88,33,03,715	1,54,43,09,04,590
84	18,88,308	997							1,88,33,03,715	1,56,31,42,08,305
85	18,88,308	997							1,88,33,03,715	1,58,19,75,12,019
86	18,88,308	997							1,88,33,03,715	1,60,08,08,15,734
87	18,88,308	997							1,88,33,03,715	1,61,96,41,19,448
88	18,88,308	997							1,88,33,03,715	1,63,84,74,23,163
89	18,88,308	997							1,88,33,03,715	1,65,73,07,26,877
90	18,88,308	997							1,88,33,03,715	1,67,61,40,30,592
91	18,88,308	997							1,88,33,03,715	1,69,49,73,34,306
92	18,88,308	997							1,88,33,03,715	1,71,38,06,38,021
93	18,88,308	997							1,88,33,03,715	1,73,26,39,41,735
94	18,88,308	997							1,88,33,03,715	1,75,14,72,45,450
95	18,88,308	997							1,88,33,03,715	1,77,03,05,49,164
96	18,88,308	997							1,88,33,03,715	1,78,91,38,52,879
97	18,88,308	997							1,88,33,03,715	1,80,79,71,56,593
98	18,88,308	997							1,88,33,03,715	1,82,68,04,60,308
99	18,88,308	997							1,88,33,03,715	1,84,56,37,64,023
100	18,88,308	997							1,88,33,03,715	1,86,44,70,67,737
T										

Table #21: Long-term area weighted average carbon stock per zone

Uncertainty assessment:

The uncertainty assessment was carried out as described in the appendix 2, box2 of VM0015 methodology. The uncertainty assessment show that Ctotal for each class was less than 10% of the average data, therefore we used average Carbon Stock value. The estimated long term (20-years) area weighted average carbon stock per zone.

6.1.2 Calculation of carbon stock change factors

To meet the requirements of step 6, the decay of carbon stock in soil carbon, below-ground biomass, dead wood and harvested wood products in the baseline case were calculated. The default linear functions was applied to account for the decay of carbon stock in initial forest classes (icl) and increase in carbon stock in post-deforestation classes.

Above ground biomass Initial forest classes – 100% release of carbon stock is assumed to occur in the end of the year when deforestation occurred, t*. Post-deforestation classes – a linear increase is assumed taking ten years (t* through to t*+9) to reach the eventual long-term average

Below ground biomass Initial forest classes – an annual release of 1/10 of the initial carbon stock (see Table 15b) during each year t* to t*+9 Post-deforestation classes – a linear increase is assumed taking ten years (t* through to t*+9) to reach the eventual long-term average.

Dead wood Initial forest classes – 100% release of carbon stock is assumed to occur in the end of the year when deforestation occurred, t*. Post-deforestation classes – a linear increase is assumed taking ten years (t* through to t*+9) to reach the eventual long-term average.

Soil organic carbon It is assumed that in a 20-years period the carbon stock changes from the level estimated for the initial forest classes (icl) to the level estimated for the post-deforestation class fcl. The change occurs linearly and can be either a decrease or an increase, depending on the carbon stock estimated for the initial forest class and for the final post-deforestation class fcl.

6.1.3 Calculation of baseline carbon stock changes

In this step, the method/option 2 was used to estimate the carbon stock change is shown in the tables below.

Project year (t)	Activity data per category x Carbon stock change factor								Total baseline carbon stock change	
	ID ct -1		ID ct -2		ID ct -...		ID ct -Ict		annual	cumulative
	ABSLPAi ct,t	ΔCtot ct,t	ABSLPAct	ΔCtot ct,t	ABSLPAct	ΔCtot ct,t	ABSLPAct	ΔCtot ct,t	ΔCBSLPA t	ΔCBSLPA
	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	ha	tCO_2-e ha^{-1}	tCO_2-e	tCO_2-e
1	1,03,636	997							10,33,59,292	10,33,59,292
2	1,02,188	997							10,19,15,158	20,52,74,450
3	65,396	997							6,52,21,393	27,04,95,843
4	21,254	997							2,11,97,252	29,16,93,094
5	10,100	997							1,00,73,033	30,17,66,127
6	3,480	997							34,70,715	30,52,36,842
7	3,480	997							34,70,715	30,87,07,557
8	3,480	997							34,70,715	31,21,78,272
9	3,480	997							34,70,715	31,56,48,987
10	3,480	997							34,70,715	31,91,19,702
11	3,480	997							34,70,715	32,25,90,417
12	3,480	997							34,70,715	32,60,61,132
13	3,480	997							34,70,715	32,95,31,847
14	3,480	997							34,70,715	33,30,02,562
15	3,480	997							34,70,715	33,64,73,277
16	3,480	997							34,70,715	33,99,43,992
17	3,480	997							34,70,715	34,34,14,707
18	3,480	997							34,70,715	34,68,85,422
19	3,480	997							34,70,715	35,03,56,137
20	3,480	997							34,70,715	35,38,26,852
21	3,480	997							34,70,715	35,72,97,567
22	3,480	997							34,70,715	36,07,68,282
23	3,480	997							34,70,715	36,42,38,997
24	3,480	997							34,70,715	36,77,09,712
25	3,480	997							34,70,715	37,11,80,427
26	3,480	997							34,70,715	37,46,51,142
27	3,480	997							34,70,715	37,81,21,857
28	3,480	997							34,70,715	38,15,92,572
29	3,480	997							34,70,715	38,50,63,287
30	3,480	997							34,70,715	38,85,34,002
31	3,480	997							34,70,715	39,20,04,717
32	3,480	997							34,70,715	39,54,75,432
33	3,480	997							34,70,715	39,89,46,147
34	3,480	997							34,70,715	40,24,16,862
35	3,480	997							34,70,715	40,58,87,577
36	3,480	997							34,70,715	40,93,58,292
37	3,480	997							34,70,715	41,28,29,007
38	3,480	997							34,70,715	41,62,99,722
39	3,480	997							34,70,715	41,97,70,437
40	3,480	997							34,70,715	42,32,41,152
41	3,480	997							34,70,715	42,67,11,867
42	3,480	997							34,70,715	43,01,82,582
43	3,480	997							34,70,715	43,36,53,297
44	3,480	997							34,70,715	43,71,24,012
45	3,480	997							34,70,715	44,05,94,727
46	3,480	997							34,70,715	44,40,65,442
47	3,480	997							34,70,715	44,75,36,157
48	3,480	997							34,70,715	45,10,06,872
49	3,480	997							34,70,715	45,44,77,587
50	3,480	997							34,70,715	45,79,48,302
51	3,480	997							34,70,715	46,14,19,017
52	3,480	997							34,70,715	46,48,89,732
53	3,480	997							34,70,715	46,83,60,447
54	3,480	997							34,70,715	47,18,31,162
55	3,480	997							34,70,715	47,53,01,877
56	3,480	997							34,70,715	47,87,72,592
57	3,480	997							34,70,715	48,22,43,307
58	3,480	997							34,70,715	48,57,14,021
59	3,480	997							34,70,715	48,91,84,736
60	3,480	997							34,70,715	49,26,55,451
61	3,480	997							34,70,715	49,61,26,166
62	3,480	997							34,70,715	49,95,96,881
63	3,480	997							34,70,715	50,30,67,596
64	3,480	997							34,70,715	50,65,38,311
65	3,480	997							34,70,715	51,00,09,026
66	3,480	997							34,70,715	51,34,79,741
67	3,480	997							34,70,715	51,69,50,456
68	3,480	997							34,70,715	52,04,21,171
69	3,480	997							34,70,715	52,38,91,886
70	3,480	997							34,70,715	52,73,62,601
71	3,480	997							34,70,715	53,08,33,316
72	3,480	997							34,70,715	53,43,04,031
73	3,480	997							34,70,715	53,77,74,746
74	3,480	997							34,70,715	54,12,45,461
75	3,480	997							34,70,715	54,47,16,176
76	3,480	997							34,70,715	54,81,86,891
77	3,480	997							34,70,715	55,16,57,606
78	3,480	997							34,70,715	55,51,28,321
79	3,480	997							34,70,715	55,85,99,036
80	3,480	997							34,70,715	56,20,69,751
81	3,480	997							34,70,715	56,55,40,466
82	3,480	997							34,70,715	56,90,11,181
83	3,480	997							34,70,715	57,24,81,896
84	3,480	997							34,70,715	57,59,52,611
85	3,480	997							34,70,715	57,94,23,326
86	3,480	997							34,70,715	58,28,94,041
87	3,480	997							34,70,715	58,63,64,756
88	3,480	997							34,70,715	58,98,35,471
89	3,480	997							34,70,715	59,33,06,186
90	3,480	997							34,70,715	59,67,76,901
91	3,480	997							34,70,715	60,02,47,616
92	3,480	997							34,70,715	60,37,18,331
93	3,480	997							34,70,715	60,71,89,046
94	3,480	997							34,70,715	61,06,59,761
95	3,480	997							34,70,715	61,41,30,476
96	3,480	997							34,70,715	61,76,01,191
97	3,480	997							34,70,715	62,10,71,906
98	3,480	997							34,70,715	62,45,42,621
99	3,480	997							34,70,715	62,80,13,336
100	3,480	997							34,70,715	63,14,84,051
T										

Table #22: Carbon stock change factors for land-use change categories (*ct* or ctz)

6.2 Estimate Baseline non-CO2 emissions from forest fires.

To estimate the non-CO2 emissions from the forest fire, the average percentage of the deforested area in which fire was used and the average proportion of mass burnt in each carbon pool (Pburnt,p), and the average combustion efficiency of each pool (CEp). This estimation was done for both Dense Forest and Sparse Forest.

Project year (t)	Total ex-ante estimated actual non-CO_2 emissions from forest fires in the project area	
	EBBBSPB annual (tCO_2-e)	EBBBSPB cumulative (tCO_2-e)
1	59,179	59,179
2	1,18,358	1,77,537
3	1,18,358	2,95,896
4	1,18,358	4,14,254
5	59,179	4,73,433
6	88,769	5,62,202
7	88,769	6,50,971
8	88,769	7,39,739
9	88,769	8,28,508
10	88,769	9,17,277
11	59,179	9,76,456
12	59,179	10,35,635
13	59,179	10,94,814
14	59,179	11,53,993
15	59,179	12,13,172
16	59,179	12,72,352
17	59,179	13,31,531
18	59,179	13,90,710
19	59,179	14,49,889
20	59,179	15,09,068
21	59,179	15,68,247
22	59,179	16,27,426
23	59,179	16,86,606
24	59,179	17,45,785
25	59,179	18,04,964
26	59,179	18,64,143
27	59,179	19,23,322
28	59,179	19,82,501
29	59,179	20,41,680
30	59,179	21,00,860
31	59,179	21,60,039
32	59,179	22,19,218
33	59,179	22,78,397
34	59,179	23,37,576
35	59,179	23,96,755
36	59,179	24,55,934
37	59,179	25,15,113
38	59,179	25,74,293
39	59,179	26,33,472
40	59,179	26,92,651
41	59,179	27,51,830
42	59,179	28,11,009
43	59,179	28,70,188
44	59,179	29,29,367
45	59,179	29,88,547
46	59,179	30,47,726
47	59,179	31,06,905
48	59,179	31,66,084
49	59,179	32,25,263
50	59,179	32,84,442
51	59,179	33,43,621
52	59,179	34,02,801
53	59,179	34,61,980
54	59,179	35,21,159
55	59,179	35,80,338
56	59,179	36,39,517
57	59,179	36,98,696
58	59,179	37,57,875
59	59,179	38,17,055
60	59,179	38,76,234
61	59,179	39,35,413
62	59,179	39,94,592
63	59,179	40,53,771
64	59,179	41,12,950
65	59,179	41,72,129
66	59,179	42,31,309
67	59,179	42,90,488
68	59,179	43,49,667
69	59,179	44,08,846
70	59,179	44,68,025
71	59,179	45,27,204
72	59,179	45,86,383
73	59,179	46,45,563
74	59,179	47,04,742
75	59,179	47,63,921
76	59,179	48,23,100
77	59,179	48,82,279
78	59,179	49,41,458
79	59,179	50,00,637
80	59,179	50,59,817
81	59,179	51,18,996
82	59,179	51,78,175
83	59,179	52,37,354
84	59,179	52,96,533
85	59,179	53,55,712
86	59,179	54,14,891
87	59,179	54,74,071
88	59,179	55,33,250
89	59,179	55,92,429
90	59,179	56,51,608
91	59,179	57,10,787
92	59,179	57,69,966
93	59,179	58,29,145
94	59,179	58,88,325
95	59,179	59,47,504
96	59,179	60,06,683
97	59,179	60,65,862
98	59,179	61,25,041
99	59,179	61,84,220
100	59,179	62,43,399
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Table #23. Parameters used to calculate non-CO2 emissions from forest fires.

7.0 Ex ante estimation of actual carbon stock changes and non-co2 emissions in the project area

The goal of this step is to provide an ex ante estimate of carbon stock changes and non-CO2 emissions from forest fire from the planned and/or unplanned activity are shown below. The planned deforestation was estimated using the following formula:

$$CUDdPAt = CBSLt * (1 - EI)$$

Where:

CUDdPAt Total ex ante actual carbon stock change due to unavoided unplanned deforestation at year t in the project area; tCO2-e

CBSLt Total baseline carbon stock change at year t in the project area; tCO2-e
EI Ex ante estimated Effectiveness Index; %

Project year (t)	Total ex ante carbon stock decrease due to planned activities		Total ex ante carbon stock increase due to planned activities		Total ex ante carbon stock decrease due to unavoided unplanned deforestation		Total ex ante net carbon stock change		Total ex ante estimated actual non-CO_2 emissions from forest fires in the project area	
	annual ΔCPAdPA	cumulative ΔCPAdPA	annual ΔCPAiPA	cumulative ΔCPAiPA	annual ΔCUDdPA	cumulative ΔCUDdPA	annual ΔCPSPA	cumulative ΔCPSPA	annual EBBPSPA	cumulative EBBPSPA
	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
1	0	0	0	0	6,31,82,958	6,31,82,958	6,31,82,958	6,31,82,958	59,179	59,179
2	0	0	0	0	13,85,15,107	20,16,98,065	13,85,15,107	20,16,98,065	1,18,358	1,77,537
3	0	0	0	0	13,85,15,107	34,02,13,172	13,85,15,107	34,02,13,172	1,18,358	2,95,896
4	0	0	0	0	13,85,15,107	47,87,28,278	13,85,15,107	47,87,28,278	1,18,358	4,14,254
5	0	0	0	0	6,31,82,958	54,19,11,236	6,31,82,958	54,19,11,236	59,179	4,73,433
6	0	0	0	0	10,38,86,330	64,57,97,566	10,38,86,330	64,57,97,566	88,769	5,62,202
7	0	0	0	0	10,38,86,330	74,96,83,896	10,38,86,330	74,96,83,896	88,769	6,50,971
8	0	0	0	0	10,38,86,330	85,35,70,226	10,38,86,330	85,35,70,226	88,769	7,39,739
9	0	0	0	0	10,38,86,330	95,74,56,556	10,38,86,330	95,74,56,556	88,769	8,28,508
10	0	0	0	0	10,38,86,330	1,06,13,42,886	10,38,86,330	1,06,13,42,886	88,769	9,17,277
11	0	0	0	0	6,92,57,553	1,13,06,00,440	6,92,57,553	1,13,06,00,440	59,179	9,76,456
12	0	0	0	0	6,92,57,553	1,19,98,57,993	6,92,57,553	1,19,98,57,993	59,179	10,35,635
13	0	0	0	0	6,92,57,553	1,26,91,15,547	6,92,57,553	1,26,91,15,547	59,179	10,94,814
14	0	0	0	0	6,92,57,553	1,33,83,73,100	6,92,57,553	1,33,83,73,100	59,179	11,53,993
15	0	0	0	0	6,92,57,553	1,40,76,30,653	6,92,57,553	1,40,76,30,653	59,179	12,13,172
16	0	0	0	0	6,92,57,553	1,47,68,88,207	6,92,57,553	1,47,68,88,207	59,179	12,72,352
17	0	0	0	0	6,92,57,553	1,54,61,45,760	6,92,57,553	1,54,61,45,760	59,179	13,31,531
18	0	0	0	0	6,92,57,553	1,61,54,03,313	6,92,57,553	1,61,54,03,313	59,179	13,90,710
19	0	0	0	0	6,92,57,553	1,68,46,60,867	6,92,57,553	1,68,46,60,867	59,179	14,49,889
20	0	0	0	0	6,92,57,553	1,75,39,18,420	6,92,57,553	1,75,39,18,420	59,179	15,09,068
21	0	0	0	0	6,92,57,553	1,82,31,75,973	6,92,57,553	1,82,31,75,973	59,179	15,68,247
22	0	0	0	0	6,92,57,553	1,89,24,33,527	6,92,57,553	1,89,24,33,527	59,179	16,27,426
23	0	0	0	0	6,92,57,553	1,96,16,91,080	6,92,57,553	1,96,16,91,080	59,179	16,86,606
24	0	0	0	0	6,92,57,553	2,03,09,48,633	6,92,57,553	2,03,09,48,633	59,179	17,45,785
25	0	0	0	0	6,92,57,553	2,10,02,06,187	6,92,57,553	2,10,02,06,187	59,179	18,04,964
26	0	0	0	0	6,92,57,553	2,16,94,63,740	6,92,57,553	2,16,94,63,740	59,179	18,64,143
27	0	0	0	0	6,92,57,553	2,23,87,21,293	6,92,57,553	2,23,87,21,293	59,179	19,23,322
28	0	0	0	0	6,92,57,553	2,30,79,78,847	6,92,57,553	2,30,79,78,847	59,179	19,82,501
29	0	0	0	0	6,92,57,553	2,37,72,36,400	6,92,57,553	2,37,72,36,400	59,179	20,41,680
30	0	0	0	0	6,92,57,553	2,44,64,93,954	6,92,57,553	2,44,64,93,954	59,179	21,00,860
31	0	0	0	0	6,92,57,553	2,51,57,51,507	6,92,57,553	2,51,57,51,507	59,179	21,60,039
32	0	0	0	0	6,92,57,553	2,58,50,09,060	6,92,57,553	2,58,50,09,060	59,179	22,19,218
33	0	0	0	0	6,92,57,553	2,65,42,66,614	6,92,57,553	2,65,42,66,614	59,179	22,78,397
34	0	0	0	0	6,92,57,553	2,72,35,24,167	6,92,57,553	2,72,35,24,167	59,179	23,37,576
35	0	0	0	0	6,92,57,553	2,79,27,81,720	6,92,57,553	2,79,27,81,720	59,179	23,96,755
36	0	0	0	0	6,92,57,553	2,86,20,39,274	6,92,57,553	2,86,20,39,274	59,179	24,55,934
37	0	0	0	0	6,92,57,553	2,93,12,96,827	6,92,57,553	2,93,12,96,827	59,179	25,15,113
38	0	0	0	0	6,92,57,553	3,00,05,54,380	6,92,57,553	3,00,05,54,380	59,179	25,74,293
39	0	0	0	0	6,92,57,553	3,06,98,11,934	6,92,57,553	3,06,98,11,934	59,179	26,33,472
40	0	0	0	0	6,92,57,553	3,13,90,69,487	6,92,57,553	3,13,90,69,487	59,179	26,92,651
41	0	0	0	0	6,92,57,553	3,20,83,27,040	6,92,57,553	3,20,83,27,040	59,179	27,51,830
42	0	0	0	0	6,92,57,553	3,27,75,84,594	6,92,57,553	3,27,75,84,594	59,179	28,11,009
43	0	0	0	0	6,92,57,553	3,34,68,42,147	6,92,57,553	3,34,68,42,147	59,179	28,70,188
44	0	0	0	0	6,92,57,553	3,41,60,99,700	6,92,57,553	3,41,60,99,700	59,179	29,29,367
45	0	0	0	0	6,92,57,553	3,48,53,57,254	6,92,57,553	3,48,53,57,254	59,179	29,88,547
46	0	0	0	0	6,92,57,553	3,55,46,14,807	6,92,57,553	3,55,46,14,807	59,179	30,47,726
47	0	0	0	0	6,92,57,553	3,62,38,72,360	6,92,57,553	3,62,38,72,360	59,179	31,06,905
48	0	0	0	0	6,92,57,553	3,69,31,29,914	6,92,57,553	3,69,31,29,914	59,179	31,66,084
49	0	0	0	0	6,92,57,553	3,76,23,87,467	6,92,57,553	3,76,23,87,467	59,179	32,25,263
50	0	0	0	0	6,92,57,553	3,83,16,45,021	6,92,57,553	3,83,16,45,021	59,179	32,84,442
51	0	0	0	0	6,92,57,553	3,90,09,02,574	6,92,57,553	3,90,09,02,574	59,179	33,43,621
52	0	0	0	0	6,92,57,553	3,97,01,60,127	6,92,57,553	3,97,01,60,127	59,179	34,02,801
53	0	0	0	0	6,92,57,553	4,03,94,17,681	6,92,57,553	4,03,94,17,681	59,179	34,61,980
54	0	0	0	0	6,92,57,553	4,10,86,75,234	6,92,57,553	4,10,86,75,234	59,179	35,21,159
55	0	0	0	0	6,92,57,553	4,17,79,32,787	6,92,57,553	4,17,79,32,787	59,179	35,80,338
56	0	0	0	0	6,92,57,553	4,24,71,90,341	6,92,57,553	4,24,71,90,341	59,179	36,39,517
57	0	0	0	0	6,92,57,553	4,31,64,47,894	6,92,57,553	4,31,64,47,894	59,179	36,98,696
58	0	0	0	0	6,92,57,553	4,38,57,05,447	6,92,57,553	4,38,57,05,447	59,179	37,57,875
59	0	0	0	0	6,92,57,553	4,45,49,63,001	6,92,57,553	4,45,49,63,001	59,179	38,17,055
60	0	0	0	0	6,92,57,553	4,52,42,20,554	6,92,57,553	4,52,42,20,554	59,179	38,76,234
61	0	0	0	0	6,92,57,553	4,59,34,78,107	6,92,57,553	4,59,34,78,107	59,179	39,35,413
62	0	0	0	0	6,92,57,553	4,66,27,35,661	6,92,57,553	4,66,27,35,661	59,179	39,94,592
63	0	0	0	0	6,92,57,553	4,73,19,93,214	6,92,57,553	4,73,19,93,214	59,179	40,53,771
64	0	0	0	0	6,92,57,553	4,80,12,50,767	6,92,57,553	4,80,12,50,767	59,179	41,12,950
65	0	0	0	0	6,92,57,553	4,87,05,08,321	6,92,57,553	4,87,05,08,321	59,179	41,72,129
66	0	0	0	0	6,92,57,553	4,93,97,65,874	6,92,57,553	4,93,97,65,874	59,179	42,31,309
67	0	0	0	0	6,92,57,553	5,00,90,23,427	6,92,57,553	5,00,90,23,427	59,179	42,90,488
68	0	0	0	0	6,92,57,553	5,07,82,80,981	6,92,57,553	5,07,82,80,981	59,179	43,49,667
69	0	0	0	0	6,92,57,553	5,14,75,38,534	6,92,57,553	5,14,75,38,534	59,179	44,08,846
70	0	0	0	0	6,92,57,553	5,21,67,96,088	6,92,57,553	5,21,67,96,088	59,179	44,68,025
71	0	0	0	0	6,92,57,553	5,28,60,53,641	6,92,57,553	5,28,60,53,641	59,179	45,27,204
72	0	0	0	0	6,92,57,553	5,35,53,11,194	6,92,57,553	5,35,53,11,194	59,179	45,86,383
73	0	0	0	0	6,92,57,553	5,42,45,68,748	6,92,57,553	5,42,45,68,748	59,179	46,45,563
74	0	0	0	0	6,92,57,553	5,49,38,26,301	6,92,57,553	5,49,38,26,301	59,179	47,04,742
75	0	0	0	0	6,92,57,553	5,56,30,83,854	6,92,57,553	5,56,30,83,854	59,179	47,63,921
76	0	0	0	0	6,92,57,553	5,63,23,41,408	6,92,57,553	5,63,23,41,408	59,179	48,23,100
77	0	0	0	0	6,92,57,553	5,70,15,98,961	6,92,57,553	5,70,15,98,961	59,179	48,82,279
78	0	0	0	0	6,92,57,553	5,77,08,56,514	6,92,57,553	5,77,08,56,514	59,179	49,41,458
79	0	0	0	0	6,92,57,553	5,84,01,14,068	6,92,57,553	5,84,01,14,068	59,179	50,00,637
80	0	0	0	0	6,92,57,553	5,90,93,71,621	6,92,57,553	5,90,93,71,621	59,179	50,59,817
81	0	0	0	0	6,92,57,553	5,97,86,29,174	6,92,57,553	5,97,86,29,174	59,179	51,18,996
82	0	0	0	0	6,92,57,553	6,04,78,86,728	6,92,57,553	6,04,78,86,728	59,179	51,78,175
83	0	0	0	0	6,92,57,553	6,11,71,44,281	6,92,57,553	6,11,71,44,281	59,179	52,37,354
84	0	0	0	0	6,92,57,553	6,18,64,01,834	6,92,57,553	6,18,64,01,834	59,179	52,96,533
85	0	0	0	0	6,92,57,553	6,25,56,59,388	6,92,57,553	6,25,56,59,388	59,179	53,55,712
86	0	0	0	0	6,92,57,553	6,32,49,16,941	6,92,57,553	6,32,49,16,941	59,179	54,14,891
87	0	0	0	0	6,92,57,553	6,39,41,74,495	6,92,57,553	6,39,41,74,495	59,179	54,74,071
88	0	0	0	0	6,92,57,553	6,46,34,32,048	6,92,57,553	6,46,34,32,048	59,179	55,33,250
89	0	0	0	0	6,92,57,553	6,53,26,89,601	6,92,57,553	6,53,26,89,601	59,179	55,92,429
90	0	0	0	0	6,92,57,553	6,60,19,47,155	6,92,57,553	6,60,19,47,155	59,179	56,51,608
91	0	0	0	0	6,92,57,553	6,67,12,04,708	6,92,57,553	6,67,12,04,708	59,179	57,10,787
92	0	0	0	0	6,92,57,553	6,74,04,62,261	6,92,57,553	6,74,04,62,261	59,179	57,69,966
93	0	0	0	0	6,92,57,553	6,80,97,19,815	6,92,57,553	6,80,97,19,815	59,179	58,29,145
94	0	0	0	0	6,92,57,553	6,87,89,77,368	6,92,57,553	6,87,89,77,368	59,179	58,88,325
95	0	0	0	0	6,92,57,553	6,94,82,34,921	6,92,57,553	6,94,82,34,921	59,179	59,47,504
96	0	0	0	0	6,92,57,553	7,01,74,92,475	6,92,57,553	7,01,74,92,475	59,179	60,06,683
97	0	0	0	0	6,92,57,553	7,08,67,50,028	6,92,57,553	7,08,67,50,028	59,179	60,65,862
98	0	0	0	0	6,92,57,553	7,15,60,07,581	6,92,57,553	7,15,60,07,581	59,179	61,25,041
99	0	0	0	0	6,92,57,553	7,22,52,65,135	6,92,57,553	7,22,52,65,135	59,179	61,84,220
100	0	0	0	0	6,92,57,553	7,29,45,22,688	6,92,57,553	7,29,45,22,688	59,179	62,43,399
T										

Table #24: Baseline non-CO2 emissions from forest fires in the project area.

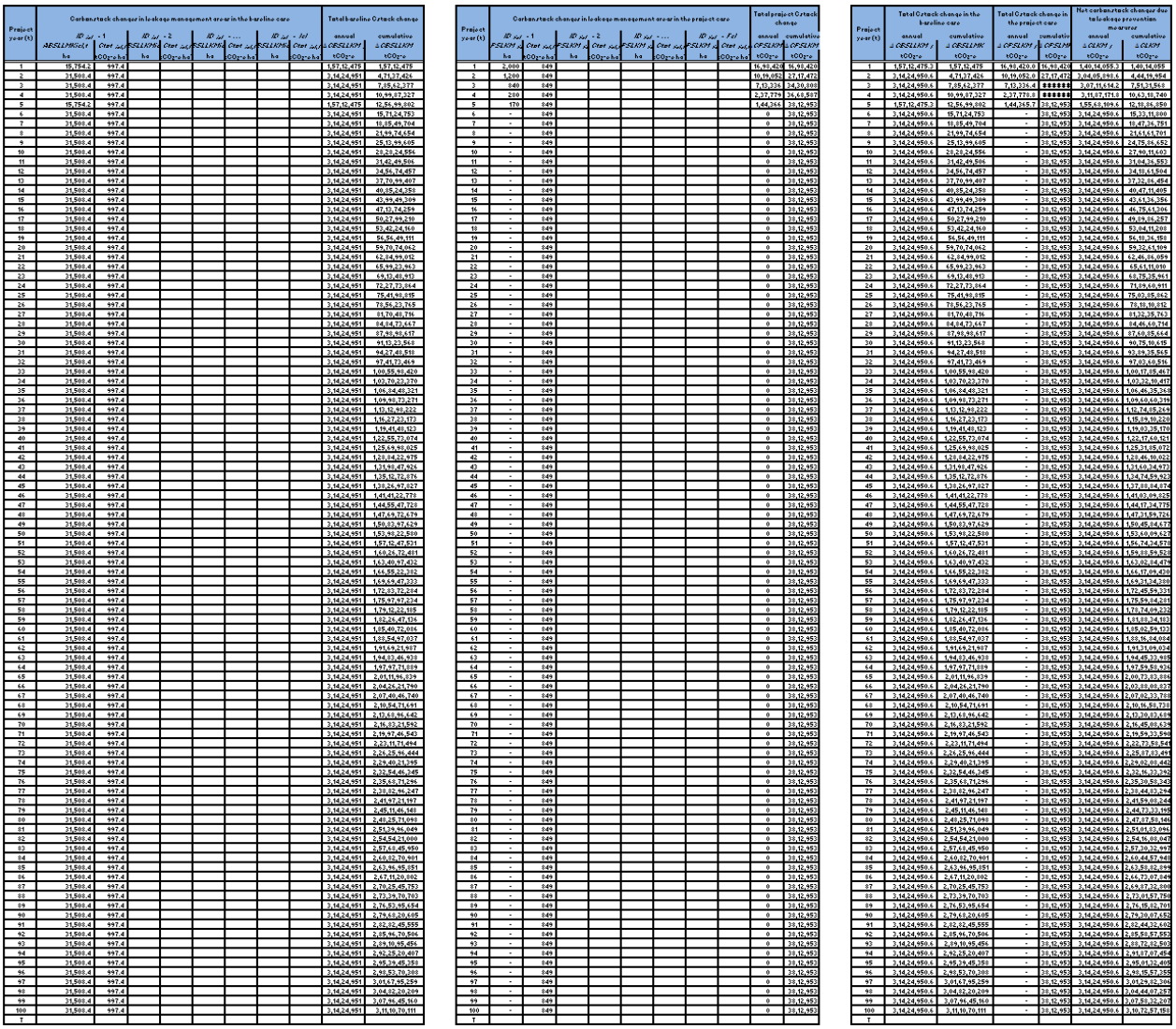

Table #25*: Ex ante* estimated net carbon stock change in the project area under the project scenario

8.0 Ex ante estimation of leakage

8.1.1 to 8.1.3: Carbon stock changes due to activities implemented in leakage management areas: The goal of this step is to provide the ex-ante estimation of the possible decrease in carbon stock and increase in GHG emissions (other than carbon stock change) due to leakage. Here, the rationale for estimating the leakage is to assist and/or plan the design of optimal leakage prevention measures, identify sources of leakage that are potentially significant, and therefore subject to MRV. Two sources of leakage considered are as follows: a).The carbon stock and increase in GHG emissions associated with leakage prevention measures, and b). Decrease in carbon stocks and increase in GHG emissions associated with activity displacement leakage. This step is non-significant as there were no leakage identified by the implemented activities.

Project year (t)	Net carbon stock changes due to leakage prevention measures		Total ex ante GHG emissions from increased grazing activities		Total ex ante increase in GHG emissions due to leakage prevention measures	
	annual ΔC_{LKPM} tCO$_2$e	cumulative ΔC_{LKPM} tCO$_2$e	annual $E_{GLK,t}$ tCO$_2$e	cumulative $E_{GLK,t}$ tCO$_2$e	annual $E_{LKPM,t}$ tCO$_2$e	cumulative E_{LKPM} tCO$_2$e
0	1,40,14,055	1,40,14,055	-	-	1,40,14,055	1,40,14,055
1	3,04,05,899	4,44,19,954	-	-	3,04,05,899	4,44,19,954
2	3,07,11,614	7,51,31,568	-	-	3,07,11,614	7,51,31,568
3	3,11,87,172	10,63,18,740	-	-	3,11,87,172	10,63,18,740
4	1,55,68,110	12,18,86,850	-	-	1,55,68,110	12,18,86,850
5	3,14,24,951	15,33,11,800	-	-	3,14,24,951	15,33,11,800
6	3,14,24,951	18,47,36,751	-	-	3,14,24,951	18,47,36,751
7	3,14,24,951	21,61,61,701	-	-	3,14,24,951	21,61,61,701
8	3,14,24,951	24,75,86,652	-	-	3,14,24,951	24,75,86,652
9	3,14,24,951	27,90,11,603	-	-	3,14,24,951	27,90,11,603
10	3,14,24,951	31,04,36,553	-	-	3,14,24,951	31,04,36,553
11	3,14,24,951	34,18,61,504	-	-	3,14,24,951	34,18,61,504
12	3,14,24,951	37,32,86,454	-	-	3,14,24,951	37,32,86,454
13	3,14,24,951	40,47,11,405	-	-	3,14,24,951	40,47,11,405
14	3,14,24,951	43,61,36,356	-	-	3,14,24,951	43,61,36,356
15	3,14,24,951	46,75,61,306	-	-	3,14,24,951	46,75,61,306
16	3,14,24,951	49,89,86,257	-	-	3,14,24,951	49,89,86,257
17	3,14,24,951	53,04,11,208	-	-	3,14,24,951	53,04,11,208
18	3,14,24,951	56,18,36,158	-	-	3,14,24,951	56,18,36,158
19	3,14,24,951	59,32,61,109	-	-	3,14,24,951	59,32,61,109
20	3,14,24,951	62,46,86,059	-	-	3,14,24,951	62,46,86,059
21	3,14,24,951	65,61,11,010	-	-	3,14,24,951	65,61,11,010
22	3,14,24,951	68,75,35,961	-	-	3,14,24,951	68,75,35,961
23	3,14,24,951	71,89,60,911	-	-	3,14,24,951	71,89,60,911
24	3,14,24,951	75,03,85,862	-	-	3,14,24,951	75,03,85,862
25	3,14,24,951	78,18,10,812	-	-	3,14,24,951	78,18,10,812
26	3,14,24,951	81,32,35,763	-	-	3,14,24,951	81,32,35,763
27	3,14,24,951	84,46,60,714	-	-	3,14,24,951	84,46,60,714
28	3,14,24,951	87,60,85,664	-	-	3,14,24,951	87,60,85,664
29	3,14,24,951	90,75,10,615	-	-	3,14,24,951	90,75,10,615
30	3,14,24,951	93,89,35,565	-	-	3,14,24,951	93,89,35,565
31	3,14,24,951	97,03,60,516	-	-	3,14,24,951	97,03,60,516
32	3,14,24,951	1,00,17,85,467	-	-	3,14,24,951	1,00,17,85,467
33	3,14,24,951	1,03,32,10,417	-	-	3,14,24,951	1,03,32,10,417
34	3,14,24,951	1,06,46,35,368	-	-	3,14,24,951	1,06,46,35,368
35	3,14,24,951	1,09,60,60,319	-	-	3,14,24,951	1,09,60,60,319
36	3,14,24,951	1,12,74,85,269	-	-	3,14,24,951	1,12,74,85,269
37	3,14,24,951	1,15,89,10,220	-	-	3,14,24,951	1,15,89,10,220
38	3,14,24,951	1,19,03,35,170	-	-	3,14,24,951	1,19,03,35,170
39	3,14,24,951	1,22,17,60,121	-	-	3,14,24,951	1,22,17,60,121
40	3,14,24,951	1,25,31,85,072	-	-	3,14,24,951	1,25,31,85,072
41	3,14,24,951	1,28,46,10,022	-	-	3,14,24,951	1,28,46,10,022
42	3,14,24,951	1,31,60,34,973	-	-	3,14,24,951	1,31,60,34,973
43	3,14,24,951	1,34,74,59,923	-	-	3,14,24,951	1,34,74,59,923
44	3,14,24,951	1,37,88,84,874	-	-	3,14,24,951	1,37,88,84,874
45	3,14,24,951	1,41,03,09,825	-	-	3,14,24,951	1,41,03,09,825
46	3,14,24,951	1,44,17,34,775	-	-	3,14,24,951	1,44,17,34,775
47	3,14,24,951	1,47,31,59,726	-	-	3,14,24,951	1,47,31,59,726
48	3,14,24,951	1,50,45,84,677	-	-	3,14,24,951	1,50,45,84,677
49	3,14,24,951	1,53,60,09,627	-	-	3,14,24,951	1,53,60,09,627
50	3,14,24,951	1,56,74,34,578	-	-	3,14,24,951	1,56,74,34,578
51	3,14,24,951	1,59,88,59,528	-	-	3,14,24,951	1,59,88,59,528
52	3,14,24,951	1,63,02,84,479	-	-	3,14,24,951	1,63,02,84,479
53	3,14,24,951	1,66,17,09,430	-	-	3,14,24,951	1,66,17,09,430
54	3,14,24,951	1,69,31,34,380	-	-	3,14,24,951	1,69,31,34,380
55	3,14,24,951	1,72,45,59,331	-	-	3,14,24,951	1,72,45,59,331
56	3,14,24,951	1,75,59,84,281	-	-	3,14,24,951	1,75,59,84,281
57	3,14,24,951	1,78,74,09,232	-	-	3,14,24,951	1,78,74,09,232
58	3,14,24,951	1,81,88,34,183	-	-	3,14,24,951	1,81,88,34,183
59	3,14,24,951	1,85,02,59,133	-	-	3,14,24,951	1,85,02,59,133
60	3,14,24,951	1,88,16,84,084	-	-	3,14,24,951	1,88,16,84,084
61	3,14,24,951	1,91,31,09,034	-	-	3,14,24,951	1,91,31,09,034
62	3,14,24,951	1,94,45,33,985	-	-	3,14,24,951	1,94,45,33,985
63	3,14,24,951	1,97,59,58,936	-	-	3,14,24,951	1,97,59,58,936
64	3,14,24,951	2,00,73,83,886	-	-	3,14,24,951	2,00,73,83,886
65	3,14,24,951	2,03,88,08,837	-	-	3,14,24,951	2,03,88,08,837
66	3,14,24,951	2,07,02,33,788	-	-	3,14,24,951	2,07,02,33,788
67	3,14,24,951	2,10,16,58,738	-	-	3,14,24,951	2,10,16,58,738
68	3,14,24,951	2,13,30,83,689	-	-	3,14,24,951	2,13,30,83,689
69	3,14,24,951	2,16,45,08,639	-	-	3,14,24,951	2,16,45,08,639
70	3,14,24,951	2,19,59,33,590	-	-	3,14,24,951	2,19,59,33,590
71	3,14,24,951	2,22,73,58,541	-	-	3,14,24,951	2,22,73,58,541
72	3,14,24,951	2,25,87,83,491	-	-	3,14,24,951	2,25,87,83,491
73	3,14,24,951	2,29,02,08,442	-	-	3,14,24,951	2,29,02,08,442
74	3,14,24,951	2,32,16,33,392	-	-	3,14,24,951	2,32,16,33,392
75	3,14,24,951	2,35,30,58,343	-	-	3,14,24,951	2,35,30,58,343
76	3,14,24,951	2,38,44,83,294	-	-	3,14,24,951	2,38,44,83,294
77	3,14,24,951	2,41,59,08,244	-	-	3,14,24,951	2,41,59,08,244
78	3,14,24,951	2,44,73,33,195	-	-	3,14,24,951	2,44,73,33,195
79	3,14,24,951	2,47,87,58,146	-	-	3,14,24,951	2,47,87,58,146
80	3,14,24,951	2,51,01,83,096	-	-	3,14,24,951	2,51,01,83,096
81	3,14,24,951	2,54,16,08,047	-	-	3,14,24,951	2,54,16,08,047
82	3,14,24,951	2,57,30,32,997	-	-	3,14,24,951	2,57,30,32,997
83	3,14,24,951	2,60,44,57,948	-	-	3,14,24,951	2,60,44,57,948
84	3,14,24,951	2,63,58,82,899	-	-	3,14,24,951	2,63,58,82,899
85	3,14,24,951	2,66,73,07,849	-	-	3,14,24,951	2,66,73,07,849
86	3,14,24,951	2,69,87,32,800	-	-	3,14,24,951	2,69,87,32,800
87	3,14,24,951	2,73,01,57,750	-	-	3,14,24,951	2,73,01,57,750
88	3,14,24,951	2,76,15,82,701	-	-	3,14,24,951	2,76,15,82,701
89	3,14,24,951	2,79,30,07,652	-	-	3,14,24,951	2,79,30,07,652
90	3,14,24,951	2,82,44,32,602	-	-	3,14,24,951	2,82,44,32,602
91	3,14,24,951	2,85,58,57,553	-	-	3,14,24,951	2,85,58,57,553
92	3,14,24,951	2,88,72,82,503	-	-	3,14,24,951	2,88,72,82,503
93	3,14,24,951	2,91,87,07,454	-	-	3,14,24,951	2,91,87,07,454
94	3,14,24,951	2,95,01,32,405	-	-	3,14,24,951	2,95,01,32,405
95	3,14,24,951	2,98,15,57,355	-	-	3,14,24,951	2,98,15,57,355
96	3,14,24,951	3,01,29,82,306	-	-	3,14,24,951	3,01,29,82,306
97	3,14,24,951	3,04,44,07,257	-	-	3,14,24,951	3,04,44,07,257
98	3,14,24,951	3,07,58,32,207	-	-	3,14,24,951	3,07,58,32,207
99	3,14,24,951	3,10,72,57,158	-	-	3,14,24,951	3,10,72,57,158
100	-	3,10,72,57,158	-	-	-	3,10,72,57,158
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Table #26: Ex ante estimation of the decrease in carbon stocks and increase in GHG emissions due to leakage prevention measures.

9.0 Ex ante total net anthropogenic ghg emission reductions.

All carbon pools and sources of GHG emissions in this project are assessed for their significance and significant sources and pools are accounted in this step. The net anthropogenic GHG emission reduction of the proposed AUD project activity is calculated as follows:

$$REDDt = (CBSLPAt + EBBBSLPAt) – (CPSPAt + EBBPSPAt) – (CLKt + ELKt)$$ (19)

Where:

REDDt Ex ante estimated net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t; tCO2e

CBSLPAt Sum of baseline carbon stock changes in the project area at year t; tCO2e

EBBBSLPAt Sum of baseline emissions from biomass burning in the project area at year t; tCO2e

CPSPAt Sum of ex ante estimated actual carbon stock changes in the project area at year t; tCO2e

EBBPSPAt Sum of (ex- ante estimated) actual emissions from biomass burning in the project area at year t; tCO2e

CLKt Sum of ex ante estimated leakage net carbon stock changes at year t; tCO2e

ELKt Sum of ex ante estimated leakage emissions at year t; tCO2e

9.1 Calculation of ex-ante Verified Carbon Units (VCUs)

The number of Verified Carbon Units (VCUs) to be generated through the proposed AUD project activity at year t is calculated as follows:

VCUt = REDDt – VBCt

VBCt = (CBSLPAt - CPSPAt) * RFt

Where:

VCUt Number of Verified Carbon Units that can be traded at time t; t CO2-e

REDDt Ex ante estimated net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t; tCO2-e ha-1

VBCt Number of Buffer Credits deposited in the VCS Buffer at time t; t CO2-e

CBSLPAt Sum of baseline carbon stock changes in the project area at year t; tCO2e

CPSPAt Sum of ex ante estimated actual carbon stock changes in the project area at year t; tCO2-e ha-1

RFt Risk factor used to calculate VCS buffer credits; %

VCUt = REDDt – VBCt (20)

VBCt = (CBSLPAt - CPSPAt) * RFt (21)

Project year (t)	Baseline carbon stock changes annual Δ CBSLPA t tCO2-e	Baseline carbon stock changes cumulative Δ CBSLPA tCO2-e	Baseline GHG emissions annual EBBBSLPA t tCO2-e	Baseline GHG emissions cumulative EBBBSLPA 10	*Ex post* project carbon stock changes annual Δ CPSPA t tCO2-e	*Ex post* project carbon stock changes cumulative Δ CPSPA tCO2-e	*Ex post* project GHG emissions annual EBBPSPA t tCO2-e	*Ex post* project GHG emissions cumulative EBBPSPA tCO2-e	*Ex post* leakage carbon stock changes annual Δ CLK t tCO2-e	*Ex post* leakage carbon stock changes cumulative Δ CLK tCO2-e	*Ex post* leakage GHG emissions annual ELK t tCO2-e	*Ex post* leakage GHG emissions cumulative ELK tCO2-e	*Ex post* net anthropogenic GHG emission reductions annual Δ REDD t tCO2-e	*Ex post* net anthropogenic GHG emission reductions cumulative Δ REDD tCO2-e	*Ex post* VCUs tradable annual VCUT t tCO2-e	*Ex post* VCUs tradable cumulative VCUT tCO2-e	*Ex ante* VCUs buffer annual VCUB t tCO2-e	*Ex ante* VCUs buffer cumulative VCUB tCO2-e
1	78,97,86,977	78,97,86,977	7,39,739	7,39,739	6,31,82,958	6,31,82,958	59,179	59,179	2,98,09,795	2,98,09,795	1,184	1,184	69,74,73,600	69,74,73,600	62,48,13,198	62,48,13,198	7,26,60,402	7,26,60,402
2	1,73,14,38,834	2,52,12,25,810	14,79,479	22,19,218	13,85,15,107	20,16,98,065	1,18,358	1,77,537	6,50,34,675	9,48,44,470	2,367	3,551	1,52,92,47,805	2,22,67,21,405	1,36,99,55,432	1,99,47,68,630	15,92,92,373	23,19,52,775
3	1,73,14,38,834	4,25,26,64,644	14,79,479	36,98,696	13,85,15,107	34,02,13,172	1,18,358	2,95,896	6,53,40,391	16,01,84,861	2,367	5,918	1,52,89,42,089	3,75,56,63,494	1,36,96,49,717	3,36,44,18,347	15,92,92,373	39,12,45,147
4	1,73,14,38,834	5,98,41,03,478	14,79,479	51,78,175	13,85,15,107	47,87,28,278	1,18,358	4,14,254	6,58,15,948	22,60,00,810	2,367	8,285	1,52,84,66,532	5,28,41,30,026	1,36,91,74,159	4,73,35,92,506	15,92,92,373	55,05,37,520
5	78,97,86,977	6,77,38,90,454	7,39,739	59,17,914	6,31,82,958	54,19,11,236	59,179	4,73,433	3,13,63,849	25,73,64,659	1,184	9,469	69,59,19,546	5,98,00,49,572	62,32,59,144	5,35,68,51,650	7,26,60,402	62,31,97,922
6	1,73,14,38,834	8,50,53,29,288	14,79,479	73,97,393	10,38,86,330	64,57,97,566	88,769	5,62,202	6,60,53,727	32,34,18,386	1,775	11,244	1,56,28,87,711	7,54,29,37,283	1,40,01,32,461	6,75,69,84,110	16,27,55,250	78,59,53,172
7	1,73,14,38,834	10,23,67,68,122	14,79,479	88,76,871	10,38,86,330	74,96,83,896	88,769	6,50,971	6,60,53,727	38,94,72,113	1,775	13,019	1,56,28,87,711	9,10,58,24,993	1,40,01,32,461	8,15,71,16,571	16,27,55,250	94,87,08,423
8	1,73,14,38,834	11,96,82,06,956	14,79,479	1,03,56,350	10,38,86,330	85,35,70,226	88,769	7,39,739	6,60,53,727	45,55,25,841	1,775	14,795	1,56,28,87,711	10,66,87,12,704	1,40,01,32,461	9,55,72,49,031	16,27,55,250	1,11,14,63,673
9	1,73,14,38,834	13,69,96,45,789	14,79,479	1,18,35,828	10,38,86,330	95,74,56,556	88,769	8,28,508	6,60,53,727	52,15,79,568	1,775	16,570	1,56,28,87,711	12,23,16,00,415	1,40,01,32,461	10,95,73,81,492	16,27,55,250	1,27,42,18,923
10	1,73,14,38,834	15,43,10,84,623	14,79,479	1,33,15,307	10,38,86,330	1,06,13,42,886	88,769	9,17,277	6,60,53,727	58,76,33,295	1,775	18,346	1,56,28,87,711	13,79,44,88,126	1,40,01,32,461	12,35,75,13,952	16,27,55,250	1,43,69,74,174
11	1,73,14,38,834	17,16,25,23,457	14,79,479	1,47,94,785	6,92,57,553	1,13,06,00,440	59,179	9,76,456	6,60,53,727	65,36,87,022	1,184	19,529	1,59,75,46,669	15,39,20,34,795	1,43,13,28,541	13,78,88,42,493	16,62,18,128	1,60,31,92,302
12	1,73,14,38,834	18,89,39,62,291	14,79,479	1,62,74,264	6,92,57,553	1,19,98,57,993	59,179	10,35,635	6,60,53,727	71,97,40,750	1,184	20,713	1,59,75,46,669	16,98,95,81,464	1,43,13,28,541	15,22,01,71,034	16,62,18,128	1,76,94,10,430
13	1,73,14,38,834	20,62,54,01,125	14,79,479	1,77,53,742	6,92,57,553	1,26,91,15,547	59,179	10,94,814	6,60,53,727	78,57,94,477	1,184	21,896	1,59,75,46,669	18,58,71,28,133	1,43,13,28,541	16,65,14,99,575	16,62,18,128	1,93,56,28,558
14	1,73,14,38,834	22,35,68,39,958	14,79,479	1,92,33,221	6,92,57,553	1,33,83,73,100	59,179	11,53,993	6,60,53,727	85,18,48,204	1,184	23,080	1,59,75,46,669	20,18,46,74,802	1,43,13,28,541	18,08,28,28,116	16,62,18,128	2,10,18,46,686
15	1,73,14,38,834	24,08,82,78,792	14,79,479	2,07,12,699	6,92,57,553	1,40,76,30,653	59,179	12,13,172	6,60,53,727	91,79,01,932	1,184	24,263	1,59,75,46,669	21,78,22,21,471	1,43,13,28,541	19,51,41,56,657	16,62,18,128	2,26,80,64,814
16	1,73,14,38,834	25,81,97,17,626	14,79,479	2,21,92,178	6,92,57,553	1,47,68,88,207	59,179	12,72,352	6,60,53,727	98,39,55,659	1,184	25,447	1,59,75,46,669	23,37,97,68,140	1,43,13,28,541	20,94,54,85,198	16,62,18,128	2,43,42,82,942
17	1,73,14,38,834	27,55,11,56,460	14,79,479	2,36,71,656	6,92,57,553	1,54,61,45,760	59,179	13,31,531	6,60,53,727	1,05,00,09,386	1,184	26,631	1,59,75,46,669	24,97,73,14,809	1,43,13,28,541	22,37,68,13,739	16,62,18,128	2,60,05,01,070
18	1,73,14,38,834	29,28,25,95,293	14,79,479	2,51,51,135	6,92,57,553	1,61,54,03,313	59,179	13,90,710	6,60,53,727	1,11,60,63,113	1,184	27,814	1,59,75,46,669	26,57,48,61,478	1,43,13,28,541	23,80,81,42,280	16,62,18,128	2,76,67,19,198
19	1,73,14,38,834	31,01,40,34,127	14,79,479	2,66,30,613	6,92,57,553	1,68,46,60,867	59,179	14,49,889	6,60,53,727	1,18,21,16,841	1,184	28,998	1,59,75,46,669	28,17,24,08,147	1,43,13,28,541	25,23,94,70,821	16,62,18,128	2,93,29,37,326
20	1,73,14,38,834	32,74,54,72,961	14,79,479	2,81,10,092	6,92,57,553	1,75,39,18,420	59,179	15,09,068	6,60,53,727	1,24,81,70,568	1,184	30,181	1,59,75,46,669	29,76,99,54,816	1,43,13,28,541	26,67,07,99,361	16,62,18,128	3,09,91,55,454
21	1,73,14,38,834	34,47,69,11,795	14,79,479	2,95,89,570	6,92,57,553	1,82,31,75,973	59,179	15,68,247	6,60,53,727	1,31,42,24,295	1,184	31,365	1,59,75,46,669	31,36,75,01,484	1,43,13,28,541	28,10,21,27,902	16,62,18,128	3,26,53,73,582
22	1,73,14,38,834	36,20,83,50,629	14,79,479	3,10,69,049	6,92,57,553	1,89,24,33,527	59,179	16,27,426	6,60,53,727	1,38,02,78,023	1,184	32,549	1,59,75,46,669	32,96,50,48,153	1,43,13,28,541	29,53,34,56,443	16,62,18,128	3,43,15,91,710
23	1,73,14,38,834	37,93,97,89,462	14,79,479	3,25,48,527	6,92,57,553	1,96,16,91,080	59,179	16,86,606	6,60,53,727	1,44,63,31,750	1,184	33,732	1,59,75,46,669	34,56,25,94,822	1,43,13,28,541	30,96,47,84,984	16,62,18,128	3,59,78,09,838
24	1,73,14,38,834	39,67,12,28,296	14,79,479	3,40,28,006	6,92,57,553	2,03,09,48,633	59,179	17,45,785	6,60,53,727	1,51,23,85,477	1,184	34,916	1,59,75,46,669	36,16,01,41,491	1,43,13,28,541	32,39,61,13,525	16,62,18,128	3,76,40,27,966
25	1,73,14,38,834	41,40,26,67,130	14,79,479	3,55,07,485	6,92,57,553	2,10,02,06,187	59,179	18,04,964	6,60,53,727	1,57,84,39,204	1,184	36,099	1,59,75,46,669	37,75,76,88,160	1,43,13,28,541	33,82,74,42,066	16,62,18,128	3,93,02,46,094
26	1,73,14,38,834	43,13,41,05,964	14,79,479	3,69,86,963	6,92,57,553	2,16,94,63,740	59,179	18,64,143	6,60,53,727	1,64,44,92,932	1,184	37,283	1,59,75,46,669	39,35,52,34,829	1,43,13,28,541	35,25,87,70,607	16,62,18,128	4,09,64,64,222
27	1,73,14,38,834	44,86,55,44,797	14,79,479	3,84,66,442	6,92,57,553	2,23,87,21,293	59,179	19,23,322	6,60,53,727	1,71,05,46,659	1,184	38,466	1,59,75,46,669	40,95,27,81,498	1,43,13,28,541	36,69,00,99,148	16,62,18,128	4,26,26,82,350
28	1,73,14,38,834	46,59,69,83,631	14,79,479	3,99,45,920	6,92,57,553	2,30,79,78,847	59,179	19,82,501	6,60,53,727	1,77,66,00,386	1,184	39,650	1,59,75,46,669	42,55,03,28,167	1,43,13,28,541	38,12,14,27,689	16,62,18,128	4,42,89,00,478
29	1,73,14,38,834	48,32,84,22,465	14,79,479	4,14,25,399	6,92,57,553	2,37,72,36,400	59,179	20,41,680	6,60,53,727	1,84,26,54,114	1,184	40,834	1,59,75,46,669	44,14,78,74,836	1,43,13,28,541	39,55,27,56,229	16,62,18,128	4,59,51,18,606
30	1,73,14,38,834	50,05,98,61,299	14,79,479	4,29,04,877	6,92,57,553	2,44,64,93,954	59,179	21,00,860	6,60,53,727	1,90,87,07,841	1,184	42,017	1,59,75,46,669	45,74,54,21,505	1,43,13,28,541	40,98,40,84,770	16,62,18,128	4,76,13,36,735
31	1,73,14,38,834	51,79,13,00,133	14,79,479	4,43,84,356	6,92,57,553	2,51,57,51,507	59,179	21,60,039	6,60,53,727	1,97,47,61,568	1,184	43,201	1,59,75,46,669	47,34,29,68,174	1,43,13,28,541	42,41,54,13,311	16,62,18,128	4,92,75,54,863
32	1,73,14,38,834	53,52,27,38,966	14,79,479	4,58,63,834	6,92,57,553	2,58,50,09,060	59,179	22,19,218	6,60,53,727	2,04,08,15,295	1,184	44,384	1,59,75,46,669	48,94,05,14,843	1,43,13,28,541	43,84,67,41,852	16,62,18,128	5,09,37,72,991
33	1,73,14,38,834	55,25,41,77,800	14,79,479	4,73,43,313	6,92,57,553	2,65,42,66,614	59,179	22,78,397	6,60,53,727	2,10,68,69,023	1,184	45,568	1,59,75,46,669	50,53,80,61,512	1,43,13,28,541	45,27,80,70,393	16,62,18,128	5,25,99,91,119
34	1,73,14,38,834	56,98,56,16,634	14,79,479	4,88,22,791	6,92,57,553	2,72,35,24,167	59,179	23,37,576	6,60,53,727	2,17,29,22,750	1,184	46,752	1,59,75,46,669	52,13,56,08,181	1,43,13,28,541	46,70,93,98,934	16,62,18,128	5,42,62,09,247
35	1,73,14,38,834	58,71,70,55,468	14,79,479	5,03,02,270	6,92,57,553	2,79,27,81,720	59,179	23,96,755	6,60,53,727	2,23,89,76,477	1,184	47,935	1,59,75,46,669	53,73,31,54,850	1,43,13,28,541	48,14,07,27,475	16,62,18,128	5,59,24,27,375
36	1,73,14,38,834	60,44,84,94,301	14,79,479	5,17,81,748	6,92,57,553	2,86,20,39,274	59,179	24,55,934	6,60,53,727	2,30,50,30,205	1,184	49,119	1,59,75,46,669	55,33,07,01,518	1,43,13,28,541	49,57,20,56,016	16,62,18,128	5,75,86,45,503
37	1,73,14,38,834	62,17,99,33,135	14,79,479	5,32,61,227	6,92,57,553	2,93,12,96,827	59,179	25,15,113	6,60,53,727	2,37,10,83,932	1,184	50,302	1,59,75,46,669	56,92,82,48,187	1,43,13,28,541	51,00,33,84,557	16,62,18,128	5,92,48,63,631
38	1,73,14,38,834	63,91,13,71,969	14,79,479	5,47,40,705	6,92,57,553	3,00,05,54,380	59,179	25,74,293	6,60,53,727	2,43,71,37,659	1,184	51,486	1,59,75,46,669	58,52,57,94,856	1,43,13,28,541	52,43,47,13,097	16,62,18,128	6,09,10,81,759
39	1,73,14,38,834	65,64,28,10,803	14,79,479	5,62,20,184	6,92,57,553	3,06,98,11,934	59,179	26,33,472	6,60,53,727	2,50,31,91,386	1,184	52,669	1,59,75,46,669	60,12,33,41,525	1,43,13,28,541	53,86,60,41,638	16,62,18,128	6,25,72,99,887
40	1,73,14,38,834	67,37,42,49,637	14,79,479	5,76,99,662	6,92,57,553	3,13,90,69,487	59,179	26,92,651	6,60,53,727	2,56,92,45,114	1,184	53,853	1,59,75,46,669	61,72,08,88,194	1,43,13,28,541	55,29,73,70,179	16,62,18,128	6,42,35,18,015
41	1,73,14,38,834	69,10,56,88,470	14,79,479	5,91,79,141	6,92,57,553	3,20,83,27,040	59,179	27,51,830	6,60,53,727	2,63,52,98,841	1,184	55,037	1,59,75,46,669	63,31,84,34,863	1,43,13,28,541	56,72,86,98,720	16,62,18,128	6,58,97,36,143
42	1,73,14,38,834	70,83,71,27,304	14,79,479	6,06,58,619	6,92,57,553	3,27,75,84,594	59,179	28,11,009	6,60,53,727	2,70,13,52,568	1,184	56,220	1,59,75,46,669	64,91,59,81,532	1,43,13,28,541	58,16,00,27,261	16,62,18,128	6,75,59,54,271
43	1,73,14,38,834	72,56,85,66,138	14,79,479	6,21,38,098	6,92,57,553	3,34,68,42,147	59,179	28,70,188	6,60,53,727	2,76,74,06,296	1,184	57,404	1,59,75,46,669	66,51,35,28,201	1,43,13,28,541	59,59,13,55,802	16,62,18,128	6,92,21,72,399
44	1,73,14,38,834	74,30,00,04,972	14,79,479	6,36,17,576	6,92,57,553	3,41,60,99,700	59,179	29,29,367	6,60,53,727	2,83,34,60,023	1,184	58,587	1,59,75,46,669	68,11,10,74,870	1,43,13,28,541	61,02,26,84,343	16,62,18,128	7,08,83,90,527
45	1,73,14,38,834	76,03,14,43,805	14,79,479	6,50,97,055	6,92,57,553	3,48,53,57,254	59,179	29,88,547	6,60,53,727	2,89,95,13,750	1,184	59,771	1,59,75,46,669	69,70,86,21,539	1,43,13,28,541	62,45,40,12,884	16,62,18,128	7,25,46,08,655
46	1,73,14,38,834	77,76,28,82,639	14,79,479	6,65,76,534	6,92,57,553	3,55,46,14,807	59,179	30,47,726	6,60,53,727	2,96,55,67,477	1,184	60,955	1,59,75,46,669	71,30,61,68,208	1,43,13,28,541	63,88,53,41,425	16,62,18,128	7,42,08,26,783
47	1,73,14,38,834	79,49,43,21,473	14,79,479	6,80,56,012	6,92,57,553	3,62,38,72,360	59,179	31,06,905	6,60,53,727	3,03,16,21,205	1,184	62,138	1,59,75,46,669	72,90,37,14,877	1,43,13,28,541	65,31,66,69,966	16,62,18,128	7,58,70,44,911
48	1,73,14,38,834	81,22,57,60,307	14,79,479	6,95,35,491	6,92,57,553	3,69,31,29,914	59,179	31,66,084	6,60,53,727	3,09,76,74,932	1,184	63,322	1,59,75,46,669	74,50,12,61,546	1,43,13,28,541	66,74,79,98,506	16,62,18,128	7,75,32,63,039
49	1,73,14,38,834	82,95,71,99,141	14,79,479	7,10,14,969	6,92,57,553	3,76,23,87,467	59,179	32,25,263	6,60,53,727	3,16,37,28,659	1,184	64,505	1,59,75,46,669	76,09,88,08,215	1,43,13,28,541	68,17,93,27,047	16,62,18,128	7,91,94,81,167
50	1,73,14,38,834	84,68,86,37,974	14,79,479	7,24,94,448	6,92,57,553	3,83,16,45,021	59,179	32,84,442	6,60,53,727	3,22,97,82,387	1,184	65,689	1,59,75,46,669	77,69,63,54,884	1,43,13,28,541	69,61,06,55,588	16,62,18,128	8,08,56,99,295
51	1,73,14,38,834	86,42,00,76,808	14,79,479	7,39,73,926	6,92,57,553	3,90,09,02,574	59,179	33,43,621	6,60,53,727	3,29,58,36,114	1,184	66,872	1,59,75,46,669	79,29,39,01,553	1,43,13,28,541	71,04,19,84,129	16,62,18,128	8,25,19,17,423
52	1,73,14,38,834	88,15,15,15,642	14,79,479	7,54,53,405	6,92,57,553	3,97,01,60,127	59,179	34,02,801	6,60,53,727	3,36,18,89,841	1,184	68,056	1,59,75,46,669	80,89,14,48,221	1,43,13,28,541	72,47,33,12,670	16,62,18,128	8,41,81,35,551
53	1,73,14,38,834	89,88,29,54,476	14,79,479	7,69,32,883	6,92,57,553	4,03,94,17,681	59,179	34,61,980	6,60,53,727	3,42,79,43,568	1,184	69,240	1,59,75,46,669	82,48,89,94,890	1,43,13,28,541	73,90,46,41,211	16,62,18,128	8,58,43,53,680
54	1,73,14,38,834	91,61,43,93,309	14,79,479	7,84,12,362	6,92,57,553	4,10,86,75,234	59,179	35,21,159	6,60,53,727	3,49,39,97,296	1,184	70,423	1,59,75,46,669	84,08,65,41,559	1,43,13,28,541	75,33,59,69,752	16,62,18,128	8,75,05,71,808
55	1,73,14,38,834	93,34,58,32,143	14,79,479	7,98,91,840	6,92,57,553	4,17,79,32,787	59,179	35,80,338	6,60,53,727	3,56,00,51,023	1,184	71,607	1,59,75,46,669	85,68,40,88,228	1,43,13,28,541	76,76,72,98,293	16,62,18,128	8,91,67,89,936
56	1,73,14,38,834	95,07,72,70,977	14,79,479	8,13,71,319	6,92,57,553	4,24,71,90,341	59,179	36,39,517	6,60,53,727	3,62,61,04,750	1,184	72,790	1,59,75,46,669	87,28,16,34,897	1,43,13,28,541	78,19,86,26,834	16,62,18,128	9,08,30,08,064
57	1,73,14,38,834	96,80,87,09,811	14,79,479	8,28,50,797	6,92,57,553	4,31,64,47,894	59,179	36,98,696	6,60,53,727	3,69,21,58,478	1,184	73,974	1,59,75,46,669	88,87,91,81,566	1,43,13,28,541	79,62,99,55,374	16,62,18,128	9,24,92,26,192
58	1,73,14,38,834	98,54,01,48,645	14,79,479	8,43,30,276	6,92,57,553	4,38,57,05,447	59,179	37,57,875	6,60,53,727	3,75,82,12,205	1,184	75,158	1,59,75,46,669	90,47,67,28,235	1,43,13,28,541	81,06,12,83,915	16,62,18,128	9,41,54,44,320
59	1,73,14,38,834	1,00,27,15,87,478	14,79,479	8,58,09,754	6,92,57,553	4,45,49,63,001	59,179	38,17,055	6,60,53,727	3,82,42,65,932	1,184	76,341	1,59,75,46,669	92,07,42,74,904	1,43,13,28,541	82,49,26,12,456	16,62,18,128	9,58,16,62,448
60	1,73,14,38,834	1,02,00,30,26,312	14,79,479	8,72,89,233	6,92,57,553	4,52,42,20,554	59,179	38,76,234	6,60,53,727	3,89,03,19,659	1,184	77,525	1,59,75,46,669	93,67,18,21,573	1,43,13,28,541	83,92,39,40,997	16,62,18,128	9,74,78,80,576
61	1,73,14,38,834	1,03,73,44,65,146	14,79,479	8,87,68,711	6,92,57,553	4,59,34,78,107	59,179	39,35,413	6,60,53,727	3,95,63,73,387	1,184	78,708	1,59,75,46,669	95,26,93,68,242	1,43,13,28,541	85,35,52,69,538	16,62,18,128	9,91,40,98,704
62	1,73,14,38,834	1,05,46,59,03,980	14,79,479	9,02,48,190	6,92,57,553	4,66,27,35,661	59,179	39,94,592	6,60,53,727	4,02,24,27,114	1,184	79,892	1,59,75,46,669	96,86,69,14,911	1,43,13,28,541	86,78,65,98,079	16,62,18,128	10,08,03,16,832
63	1,73,14,38,834	1,07,19,73,42,813	14,79,479	9,17,27,668	6,92,57,553	4,73,19,93,214	59,179	40,53,771	6,60,53,727	4,08,84,80,841	1,184	81,075	1,59,75,46,669	98,46,44,61,580	1,43,13,28,541	88,21,79,26,620	16,62,18,128	10,24,65,34,960
64	1,73,14,38,834	1,08,92,87,81,647	14,79,479	9,32,07,147	6,92,57,553	4,80,12,50,767	59,179	41,12,950	6,60,53,727	4,15,45,34,569	1,184	82,259	1,59,75,46,669	1,00,06,20,08,249	1,43,13,28,541	89,64,92,55,161	16,62,18,128	10,41,27,53,088
65	1,73,14,38,834	1,10,66,02,20,481	14,79,479	9,46,86,625	6,92,57,553	4,87,05,08,321	59,179	41,72,129	6,60,53,727	4,22,05,88,296	1,184	83,443	1,59,75,46,669	1,01,65,95,54,918	1,43,13,28,541	91,08,05,83,702	16,62,18,128	10,57,89,71,216
66	1,73,14,38,834	1,12,39,16,59,315	14,79,479	9,61,66,104	6,92,57,553	4,93,97,65,874	59,179	42,31,309	6,60,53,727	4,28,66,42,023	1,184	84,626	1,59,75,46,669	1,03,25,71,01,587	1,43,13,28,541	92,51,19,12,243	16,62,18,128	10,74,51,89,344
67	1,73,14,38,834	1,14,12,30,98,148	14,79,479	9,76,45,582	6,92,57,553	5,00,90,23,427	59,179	42,90,488	6,60,53,727	4,35,26,95,751	1,184	85,810	1,59,75,46,669	1,04,85,46,48,255	1,43,13,28,541	93,94,32,40,783	16,62,18,128	10,91,14,07,472
68	1,73,14,38,834	1,15,85,45,36,982	14,79,479	9,91,25,061	6,92,57,553	5,07,82,80,981	59,179	43,49,667	6,60,53,727	4,41,87,49,478	1,184	86,993	1,59,75,46,669	1,06,45,21,94,924	1,43,13,28,541	95,37,45,69,324	16,62,18,128	11,07,76,25,600
69	1,73,14,38,834	1,17,58,59,75,816	14,79,479	10,06,04,540	6,92,57,553	5,14,75,38,534	59,179	44,08,846	6,60,53,727	4,48,48,03,205	1,184	88,177	1,59,75,46,669	1,08,04,97,41,593	1,43,13,28,541	96,80,58,97,865	16,62,18,128	11,24,38,43,728
70	1,73,14,38,834	1,19,31,74,14,650	14,79,479	10,20,84,018	6,92,57,553	5,21,67,96,088	59,179	44,68,025	6,60,53,727	4,55,08,56,932	1,184	89,361	1,59,75,46,669	1,09,64,72,88,262	1,43,13,28,541	98,23,72,26,406	16,62,18,128	11,41,00,61,856
71	1,73,14,38,834	1,21,04,88,53,484	14,79,479	10,35,63,497	6,92,57,553	5,28,60,53,641	59,179	45,27,204	6,60,53,727	4,61,69,10,660	1,184	90,544	1,59,75,46,669	1,11,24,48,34,931	1,43,13,28,541	99,66,85,54,947	16,62,18,128	11,57,62,79,984
72	1,73,14,38,834	1,22,78,02,92,317	14,79,479	10,50,42,975	6,92,57,553	5,35,53,11,194	59,179	45,86,383	6,60,53,727	4,68,29,64,387	1,184	91,728	1,59,75,46,669	1,12,84,23,81,600	1,43,13,28,541	1,01,09,98,83,488	16,62,18,128	11,74,24,98,112
73	1,73,14,38,834	1,24,51,17,31,151	14,79,479	10,65,22,454	6,92,57,553	5,42,45,68,748	59,179	46,45,563	6,60,53,727	4,74,90,18,114	1,184	92,911	1,59,75,46,669	1,14,43,99,28,269	1,43,13,28,541	1,02,53,12,12,029	16,62,18,128	11,90,87,16,240
74	1,73,14,38,834	1,26,24,31,69,985	14,79,479	10,80,01,932	6,92,57,553	5,49,38,26,301	59,179	47,04,742	6,60,53,727	4,81,50,71,842	1,184	94,095	1,59,75,46,669	1,16,03,74,74,938	1,43,13,28,541	1,03,96,25,40,570	16,62,18,128	12,07,49,34,368
75	1,73,14,38,834	1,27,97,46,08,819	14,79,479	10,94,81,411	6,92,57,553	5,56,30,83,854	59,179	47,63,921	6,60,53,727	4,88,11,25,569	1,184	95,278	1,59,75,46,669	1,17,63,50,21,607	1,43,13,28,541	1,05,39,38,69,111	16,62,18,128	12,24,11,52,496
76	1,73,14,38,834	1,29,70,60,47,652	14,79,479	11,09,60,889	6,92,57,553	5,63,23,41,408	59,179	48,23,100	6,60,53,727	4,94,71,79,296	1,184	96,462	1,59,75,46,669	1,19,23,25,68,276	1,43,13,28,541	1,06,82,51,97,651	16,62,18,128	12,40,73,70,624
77	1,73,14,38,834	1,31,43,74,86,486	14,79,479	11,24,40,368	6,92,57,553	5,70,15,98,961	59,179	48,82,279	6,60,53,727	5,01,32,33,023	1,184	97,646	1,59,75,46,669	1,20,83,01,14,945	1,43,13,28,541	1,08,25,65,26,192	16,62,18,128	12,57,35,88,753
78	1,73,14,38,834	1,33,16,89,25,320	14,79,479	11,39,19,846	6,92,57,553	5,77,08,56,514	59,179	49,41,458	6,60,53,727	5,07,92,86,751	1,184	98,829	1,59,75,46,669	1,22,42,76,61,614	1,43,13,28,541	1,09,68,78,54,733	16,62,18,128	12,73,98,06,881
79	1,73,14,38,834	1,34,90,03,64,154	14,79,479	11,53,99,325	6,92,57,553	5,84,01,14,068	59,179	50,00,637	6,60,53,727	5,14,53,40,478	1,184	1,00,013	1,59,75,46,669	1,24,02,52,08,283	1,43,13,28,541	1,11,11,91,83,274	16,62,18,128	12,90,60,25,009
80	1,73,14,38,834	1,36,63,18,02,988	14,79,479	11,68,78,803	6,92,57,553	5,90,93,71,621	59,179	50,59,817	6,60,53,727	5,21,13,94,205	1,184	1,01,196	1,59,75,46,669	1,25,62,27,54,952	1,43,13,28,541	1,12,55,05,11,815	16,62,18,128	13,07,22,43,137
81	1,73,14,38,834	1,38,36,32,41,821	14,79,479	11,83,58,282	6,92,57,553	5,97,86,29,174	59,179	51,18,996	6,60,53,727	5,27,74,47,933	1,184	1,02,380	1,59,75,46,669	1,27,22,03,01,621	1,43,13,28,541	1,13,98,18,40,356	16,62,18,128	13,23,84,61,265
82	1,73,14,38,834	1,40,09,46,80,655	14,79,479	11,98,37,760	6,92,57,553	6,04,78,86,728	59,179	51,78,175	6,60,53,727	5,34,35,01,660	1,184	1,03,563	1,59,75,46,669	1,28,81,78,48,290	1,43,13,28,541	1,15,41,31,68,897	16,62,18,128	13,40,46,79,393
83	1,73,14,38,834	1,41,82,61,19,489	14,79,479	12,13,17,239	6,92,57,553	6,11,71,44,281	59,179	52,37,354	6,60,53,727	5,40,95,55,387	1,184	1,04,747	1,59,75,46,669	1,30,41,53,94,958	1,43,13,28,541	1,16,84,44,97,438	16,62,18,128	13,57,08,97,521
84	1,73,14,38,834	1,43,55,75,58,323	14,79,479	12,27,96,717	6,92,57,553	6,18,64,01,834	59,179	52,96,533	6,60,53,727	5,47,56,09,114	1,184	1,05,931	1,59,75,46,669	1,32,01,29,41,627	1,43,13,28,541	1,18,27,58,25,979	16,62,18,128	13,73,71,15,649
85	1,73,14,38,834	1,45,28,89,97,156	14,79,479	12,42,76,196	6,92,57,553	6,25,56,59,388	59,179	53,55,712	6,60,53,727	5,54,16,62,842	1,184	1,07,114	1,59,75,46,669	1,33,61,04,88,296	1,43,13,28,541	1,19,70,71,54,519	16,62,18,128	13,90,33,33,777
86	1,73,14,38,834	1,47,02,04,35,990	14,79,479	12,57,55,674	6,92,57,553	6,32,49,16,941	59,179	54,14,891	6,60,53,727	5,60,77,16,569	1,184	1,08,298	1,59,75,46,669	1,35,20,80,34,965	1,43,13,28,541	1,21,13,84,83,060	16,62,18,128	14,06,95,51,905
87	1,73,14,38,834	1,48,75,18,74,824	14,79,479	12,72,35,153	6,92,57,553	6,39,41,74,495	59,179	54,74,071	6,60,53,727	5,67,37,70,296	1,184	1,09,481	1,59,75,46,669	1,36,80,55,81,634	1,43,13,28,541	1,22,56,98,11,601	16,62,18,128	14,23,57,70,033
88	1,73,14,38,834	1,50,48,33,13,658	14,79,479	12,87,14,631	6,92,57,553	6,46,34,32,048	59,179	55,33,250	6,60,53,727	5,73,98,24,024	1,184	1,10,665	1,59,75,46,669	1,38,40,31,28,303	1,43,13,28,541	1,24,00,11,40,142	16,62,18,128	14,40,19,88,161
89	1,73,14,38,834	1,52,21,47,52,492	14,79,479	13,01,94,110	6,92,57,553	6,53,26,89,601	59,179	55,92,429	6,60,53,727	5,80,58,77,751	1,184	1,11,849	1,59,75,46,669	1,40,00,06,74,972	1,43,13,28,541	1,25,43,24,68,683	16,62,18,128	14,56,82,06,289
90	1,73,14,38,834	1,53,94,61,91,325	14,79,479	13,16,73,588	6,92,57,553	6,60,19,47,155	59,179	56,51,608	6,60,53,727	5,87,19,31,478	1,184	1,13,032	1,59,75,46,669	1,41,59,82,21,641	1,43,13,28,541	1,26,86,37,97,224	16,62,18,128	14,73,44,24,417
91	1,73,14,38,834	1,55,67,76,30,159	14,79,479	13,31,53,067	6,92,57,553	6,67,12,04,708	59,179	57,10,787	6,60,53,727	5,93,79,85,205	1,184	1,14,216	1,59,75,46,669	1,43,19,57,68,310	1,43,13,28,541	1,28,29,51,25,765	16,62,18,128	14,90,06,42,545
92	1,73,14,38,834	1,57,40,90,68,993	14,79,479	13,46,32,546	6,92,57,553	6,74,04,62,261	59,179	57,69,966	6,60,53,727	6,00,40,38,933	1,184	1,15,399	1,59,75,46,669	1,44,79,33,14,979	1,43,13,28,541	1,29,72,64,54,306	16,62,18,128	15,06,68,60,673
93	1,73,14,38,834	1,59,14,05,07,827	14,79,479	13,61,12,024	6,92,57,553	6,80,97,19,815	59,179	58,29,145	6,60,53,727	6,07,00,92,660	1,184	1,16,583	1,59,75,46,669	1,46,39,08,61,648	1,43,13,28,541	1,31,15,77,82,847	16,62,18,128	15,23,30,78,801
94	1,73,14,38,834	1,60,87,19,46,660	14,79,479	13,75,91,503	6,92,57,553	6,87,89,77,368	59,179	58,88,325	6,60,53,727	6,13,61,46,387	1,184	1,17,766	1,59,75,46,669	1,47,98,84,08,317	1,43,13,28,541	1,32,58,91,11,388	16,62,18,128	15,39,92,96,929
95	1,73,14,38,834	1,62,60,33,85,494	14,79,479	13,90,70,981	6,92,57,553	6,94,82,34,921	59,179	59,47,504	6,60,53,727	6,20,22,00,115	1,184	1,18,950	1,59,75,46,669	1,49,58,59,54,986	1,43,13,28,541	1,34,02,04,39,928	16,62,18,128	15,56,55,15,057
96	1,73,14,38,834	1,64,33,48,24,328	14,79,479	14,05,50,460	6,92,57,553	7,01,74,92,475	59,179	60,06,683	6,60,53,727	6,26,82,53,842	1,184	1,20,134	1,59,75,46,669	1,51,18,35,01,655	1,43,13,28,541	1,35,45,17,68,469	16,62,18,128	15,73,17,33,185
97	1,73,14,38,834	1,66,06,62,63,162	14,79,479	14,20,29,938	6,92,57,553	7,08,67,50,028	59,179	60,65,862	6,60,53,727	6,33,43,07,569	1,184	1,21,317	1,59,75,46,669	1,52,78,10,48,324	1,43,13,28,541	1,36,88,30,97,010	16,62,18,128	15,89,79,51,313
98	1,73,14,38,834	1,67,79,77,01,996	14,79,479	14,35,09,417	6,92,57,553	7,15,60,07,581	59,179	61,25,041	6,60,53,727	6,40,03,61,296	1,184	1,22,501	1,59,75,46,669	1,54,37,85,94,992	1,43,13,28,541	1,38,31,44,25,551	16,62,18,128	16,06,41,69,441
99	1,73,14,38,834	1,69,52,91,40,829	14,79,479	14,49,88,895	6,92,57,553	7,22,52,65,135	59,179	61,84,220	6,60,53,727	6,46,64,15,024	1,184	1,23,684	1,59,75,46,669	1,55,97,61,41,661	1,43,13,28,541	1,39,74,57,54,092	16,62,18,128	16,23,03,87,569
100	1,73,14,38,834	1,71,26,05,79,663	14,79,479	14,64,68,374	6,92,57,553	7,29,45,22,688	59,179	62,43,399	6,60,53,727	6,53,24,68,751	1,184	1,24,868	1,59,75,46,669	1,57,57,36,88,330	1,43,13,28,541	1,41,17,70,82,633	16,62,18,128	16,39,66,05,698
T															1,41,17,70,826			

Table #27: Ex ante estimated net anthropogenic GHG emission reductions (REDDt) and Verified Carbon Units (VCUt)

3.2.2 Project Emissions

For Ex ante estimation of actual carbon stock changes and non-CO2 emissions in the project area refer to section Step #7 in the section 4.1 in this document and its related tables.

3.2.3 Leakage

The project activities do not generate any GHG emissions thus GHG's are not generated from leakage prevention activities.

3.2.4 Net GHG Emission Reductions and Removals

Project year (t)	Baseline carbon stock changes annual ΔCBSLPA,t tCO2-e	Baseline carbon stock changes cumulative ΔCBSLPA tCO2-e	Baseline GHG emissions annual EBBBSLPA,t tCO2-e	Baseline GHG emissions cumulative EBBBSLPA 10	Ex post project carbon stock changes annual ΔCPSPA,t tCO2-e	Ex post project carbon stock changes cumulative ΔCPSPA tCO2-e	Ex post project GHG emissions annual EBBPSPA,t tCO2-e	Ex post project GHG emissions cumulative EBBPSPA tCO2-e	Ex post leakage carbon stock changes annual ΔCLK,t tCO2-e	Ex post leakage carbon stock changes cumulative ΔCLK tCO2-e	Ex post leakage GHG emissions annual ELK,t tCO2-e	Ex post leakage GHG emissions cumulative ELK tCO2-e	Ex post net anthropogenic GHG emission reductions annual ΔREDD,t tCO2-e	Ex post net anthropogenic GHG emission reductions cumulative ΔREDD tCO2-e	Ex post VCUs tradable annual VCUT,t tCO2-e	Ex post VCUs tradable cumulative VCUT tCO2-e	Ex ante VCUs buffer annual VCUB,t tCO2-e	Ex ante VCUs buffer cumulative VCUB tCO2-e
1	78,97,86,977	78,97,86,977	7,39,739	7,39,739	6,31,82,958	6,31,82,958	59,179	59,179	2,98,09,795	2,98,09,795	1,184	1,184	69,74,73,600	69,74,73,600	62,48,13,198	62,48,13,198	7,26,60,402	7,26,60,402
2	1,73,14,38,834	2,52,12,25,810	14,79,479	22,19,218	13,85,15,107	20,16,98,065	1,18,358	1,77,537	6,50,34,675	9,48,44,470	2,367	3,551	1,52,92,47,805	2,22,67,21,405	1,36,99,55,432	1,99,47,68,630	15,92,92,373	23,19,52,775
3	1,73,14,38,834	4,25,26,64,644	14,79,479	36,98,696	13,85,15,107	34,02,13,172	1,18,358	2,95,896	6,53,40,391	16,01,84,861	2,367	5,918	1,52,89,42,089	3,75,56,63,494	1,36,96,49,717	3,36,44,18,347	15,92,92,373	39,12,45,147
4	1,73,14,38,834	5,98,41,03,478	14,79,479	51,78,175	13,85,15,107	47,87,28,278	1,18,358	4,14,254	6,58,15,948	22,60,00,810	2,367	8,285	1,52,84,66,532	5,28,41,30,026	1,36,91,74,159	4,73,35,92,506	15,92,92,373	55,05,37,520
5	78,97,86,977	6,77,38,90,454	7,39,739	59,17,914	6,31,82,958	54,19,11,236	59,179	4,73,433	3,13,63,849	25,73,64,659	1,184	9,469	69,59,19,546	5,98,00,49,572	62,32,59,144	5,35,68,51,650	7,26,60,402	62,31,97,922
6	1,73,14,38,834	8,50,53,29,288	14,79,479	73,97,393	10,38,86,330	64,57,97,566	88,769	5,62,202	6,60,53,727	32,34,18,386	1,775	11,244	1,56,28,87,711	7,54,29,37,283	1,40,01,32,461	6,75,69,84,110	16,27,55,250	78,59,53,172
7	1,73,14,38,834	10,23,67,68,122	14,79,479	88,76,871	10,38,86,330	74,96,83,896	88,769	6,50,971	6,60,53,727	38,94,72,113	1,775	13,019	1,56,28,87,711	9,10,58,24,993	1,40,01,32,461	8,15,71,16,571	16,27,55,250	94,87,08,423
8	1,73,14,38,834	11,96,82,06,956	14,79,479	1,03,56,350	10,38,86,330	85,35,70,226	88,769	7,39,739	6,60,53,727	45,55,25,841	1,775	14,795	1,56,28,87,711	10,66,87,12,704	1,40,01,32,461	9,55,72,49,031	16,27,55,250	1,11,14,63,673
9	1,73,14,38,834	13,69,96,45,789	14,79,479	1,18,35,828	10,38,86,330	95,74,56,556	88,769	8,28,508	6,60,53,727	52,15,79,568	1,775	16,570	1,56,28,87,711	12,23,16,00,415	1,40,01,32,461	10,95,73,81,492	16,27,55,250	1,27,42,18,923
10	1,73,14,38,834	15,43,10,84,623	14,79,479	1,33,15,307	10,38,86,330	1,06,13,42,886	88,769	9,17,277	6,60,53,727	58,76,33,295	1,775	18,346	1,56,28,87,711	13,79,44,88,126	1,40,01,32,461	12,35,75,13,952	16,27,55,250	1,43,69,74,174
11	1,73,14,38,834	17,16,25,23,457	14,79,479	1,47,94,785	6,92,57,553	1,13,06,00,440	59,179	9,76,456	6,60,53,727	65,36,87,022	1,184	19,529	1,59,75,46,669	15,39,20,34,795	1,43,13,28,541	13,78,88,42,493	16,62,18,128	1,60,31,92,302
12	1,73,14,38,834	18,89,39,62,291	14,79,479	1,62,74,264	6,92,57,553	1,19,98,57,993	59,179	10,35,635	6,60,53,727	71,97,40,750	1,184	20,713	1,59,75,46,669	16,98,95,81,464	1,43,13,28,541	15,22,01,71,034	16,62,18,128	1,76,94,10,430
13	1,73,14,38,834	20,62,54,01,125	14,79,479	1,77,53,742	6,92,57,553	1,26,91,15,547	59,179	10,94,814	6,60,53,727	78,57,94,477	1,184	21,896	1,59,75,46,669	18,58,71,28,133	1,43,13,28,541	16,65,14,99,575	16,62,18,128	1,93,56,28,558
14	1,73,14,38,834	22,35,68,39,958	14,79,479	1,92,33,221	6,92,57,553	1,33,83,73,100	59,179	11,53,993	6,60,53,727	85,18,48,204	1,184	23,080	1,59,75,46,669	20,18,46,74,802	1,43,13,28,541	18,08,28,28,116	16,62,18,128	2,10,18,46,686
15	1,73,14,38,834	24,08,82,78,792	14,79,479	2,07,12,699	6,92,57,553	1,40,76,30,653	59,179	12,13,172	6,60,53,727	91,79,01,932	1,184	24,263	1,59,75,46,669	21,78,22,21,471	1,43,13,28,541	19,51,41,56,657	16,62,18,128	2,26,80,64,814
16	1,73,14,38,834	25,81,97,17,626	14,79,479	2,21,92,178	6,92,57,553	1,47,68,88,207	59,179	12,72,352	6,60,53,727	98,39,55,659	1,184	25,447	1,59,75,46,669	23,37,97,68,140	1,43,13,28,541	20,94,54,85,198	16,62,18,128	2,43,42,82,942
17	1,73,14,38,834	27,55,11,56,460	14,79,479	2,36,71,656	6,92,57,553	1,54,61,45,760	59,179	13,31,531	6,60,53,727	1,05,00,09,386	1,184	26,631	1,59,75,46,669	24,97,73,14,809	1,43,13,28,541	22,37,68,13,739	16,62,18,128	2,60,05,01,070
18	1,73,14,38,834	29,28,25,95,293	14,79,479	2,51,51,135	6,92,57,553	1,61,54,03,313	59,179	13,90,710	6,60,53,727	1,11,60,63,113	1,184	27,814	1,59,75,46,669	26,57,48,61,478	1,43,13,28,541	23,80,81,42,280	16,62,18,128	2,76,67,19,198
19	1,73,14,38,834	31,01,40,34,127	14,79,479	2,66,30,613	6,92,57,553	1,68,46,60,867	59,179	14,49,889	6,60,53,727	1,18,21,16,841	1,184	28,998	1,59,75,46,669	28,17,24,08,147	1,43,13,28,541	25,23,94,70,821	16,62,18,128	2,93,29,37,326
20	1,73,14,38,834	32,74,54,72,961	14,79,479	2,81,10,092	6,92,57,553	1,75,39,18,420	59,179	15,09,068	6,60,53,727	1,24,81,70,568	1,184	30,181	1,59,75,46,669	29,76,99,54,816	1,43,13,28,541	26,67,07,99,361	16,62,18,128	3,09,91,55,454
21	1,73,14,38,834	34,47,69,11,795	14,79,479	2,95,89,570	6,92,57,553	1,82,31,75,973	59,179	15,68,247	6,60,53,727	1,31,42,24,295	1,184	31,365	1,59,75,46,669	31,36,75,01,484	1,43,13,28,541	28,10,21,27,902	16,62,18,128	3,26,53,73,582
22	1,73,14,38,834	36,20,83,50,629	14,79,479	3,10,69,049	6,92,57,553	1,89,24,33,527	59,179	16,27,426	6,60,53,727	1,38,02,78,023	1,184	32,549	1,59,75,46,669	32,96,50,48,153	1,43,13,28,541	29,53,34,56,443	16,62,18,128	3,43,15,91,710
23	1,73,14,38,834	37,93,97,89,462	14,79,479	3,25,48,527	6,92,57,553	1,96,16,91,080	59,179	16,86,606	6,60,53,727	1,44,63,31,750	1,184	33,732	1,59,75,46,669	34,56,25,94,822	1,43,13,28,541	30,96,47,84,984	16,62,18,128	3,59,78,09,838
24	1,73,14,38,834	39,67,12,28,296	14,79,479	3,40,28,006	6,92,57,553	2,03,09,48,633	59,179	17,45,785	6,60,53,727	1,51,23,85,477	1,184	34,916	1,59,75,46,669	36,16,01,41,491	1,43,13,28,541	32,39,61,13,525	16,62,18,128	3,76,40,27,966
25	1,73,14,38,834	41,40,26,67,130	14,79,479	3,55,07,485	6,92,57,553	2,10,02,06,187	59,179	18,04,964	6,60,53,727	1,57,84,39,204	1,184	36,099	1,59,75,46,669	37,75,76,88,160	1,43,13,28,541	33,82,74,42,066	16,62,18,128	3,93,02,46,094
26	1,73,14,38,834	43,13,41,05,964	14,79,479	3,69,86,963	6,92,57,553	2,16,94,63,740	59,179	18,64,143	6,60,53,727	1,64,44,92,932	1,184	37,283	1,59,75,46,669	39,35,52,34,829	1,43,13,28,541	35,25,87,70,607	16,62,18,128	4,09,64,64,222
27	1,73,14,38,834	44,86,55,44,797	14,79,479	3,84,66,442	6,92,57,553	2,23,87,21,293	59,179	19,23,322	6,60,53,727	1,71,05,46,659	1,184	38,466	1,59,75,46,669	40,95,27,81,498	1,43,13,28,541	36,69,00,99,148	16,62,18,128	4,26,26,82,350
28	1,73,14,38,834	46,59,69,83,631	14,79,479	3,99,45,920	6,92,57,553	2,30,79,78,847	59,179	19,82,501	6,60,53,727	1,77,66,00,386	1,184	39,650	1,59,75,46,669	42,55,03,28,167	1,43,13,28,541	38,12,14,27,689	16,62,18,128	4,42,89,00,478
29	1,73,14,38,834	48,32,84,22,465	14,79,479	4,14,25,399	6,92,57,553	2,37,72,36,400	59,179	20,41,680	6,60,53,727	1,84,26,54,114	1,184	40,834	1,59,75,46,669	44,14,78,74,836	1,43,13,28,541	39,55,27,56,229	16,62,18,128	4,59,51,18,606
30	1,73,14,38,834	50,05,98,61,299	14,79,479	4,29,04,877	6,92,57,553	2,44,64,93,954	59,179	21,00,860	6,60,53,727	1,90,87,07,841	1,184	42,017	1,59,75,46,669	45,74,54,21,505	1,43,13,28,541	40,98,40,84,770	16,62,18,128	4,76,13,36,735
31	1,73,14,38,834	51,79,13,00,133	14,79,479	4,43,84,356	6,92,57,553	2,51,57,51,507	59,179	21,60,039	6,60,53,727	1,97,47,61,568	1,184	43,201	1,59,75,46,669	47,34,29,68,174	1,43,13,28,541	42,41,54,13,311	16,62,18,128	4,92,75,54,863
32	1,73,14,38,834	53,52,27,38,966	14,79,479	4,58,63,834	6,92,57,553	2,58,50,09,060	59,179	22,19,218	6,60,53,727	2,04,08,15,295	1,184	44,384	1,59,75,46,669	48,94,05,14,843	1,43,13,28,541	43,84,67,41,852	16,62,18,128	5,09,37,72,991
33	1,73,14,38,834	55,25,41,77,800	14,79,479	4,73,43,313	6,92,57,553	2,65,42,66,614	59,179	22,78,397	6,60,53,727	2,10,68,69,023	1,184	45,568	1,59,75,46,669	50,53,80,61,512	1,43,13,28,541	45,27,80,70,393	16,62,18,128	5,25,99,91,119
34	1,73,14,38,834	56,98,56,16,634	14,79,479	4,88,22,791	6,92,57,553	2,72,35,24,167	59,179	23,37,576	6,60,53,727	2,17,29,22,750	1,184	46,752	1,59,75,46,669	52,13,56,08,181	1,43,13,28,541	46,70,93,98,934	16,62,18,128	5,42,62,09,247
35	1,73,14,38,834	58,71,70,55,468	14,79,479	5,03,02,270	6,92,57,553	2,79,27,81,720	59,179	23,96,755	6,60,53,727	2,23,89,76,477	1,184	47,935	1,59,75,46,669	53,73,31,54,850	1,43,13,28,541	48,14,07,27,475	16,62,18,128	5,59,24,27,375
36	1,73,14,38,834	60,44,84,94,301	14,79,479	5,17,81,748	6,92,57,553	2,86,20,39,274	59,179	24,55,934	6,60,53,727	2,30,50,30,205	1,184	49,119	1,59,75,46,669	55,33,07,01,518	1,43,13,28,541	49,57,20,56,016	16,62,18,128	5,75,86,45,503
37	1,73,14,38,834	62,17,99,33,135	14,79,479	5,32,61,227	6,92,57,553	2,93,12,96,827	59,179	25,15,113	6,60,53,727	2,37,10,83,932	1,184	50,302	1,59,75,46,669	56,92,82,48,187	1,43,13,28,541	51,00,33,84,557	16,62,18,128	5,92,48,63,631
38	1,73,14,38,834	63,91,13,71,969	14,79,479	5,47,40,705	6,92,57,553	3,00,05,54,380	59,179	25,74,293	6,60,53,727	2,43,71,37,659	1,184	51,486	1,59,75,46,669	58,52,57,94,856	1,43,13,28,541	52,43,47,13,097	16,62,18,128	6,09,10,81,759
39	1,73,14,38,834	65,64,28,10,803	14,79,479	5,62,20,184	6,92,57,553	3,06,98,11,934	59,179	26,33,472	6,60,53,727	2,50,31,91,386	1,184	52,669	1,59,75,46,669	60,12,33,41,525	1,43,13,28,541	53,86,60,41,638	16,62,18,128	6,25,72,99,887
40	1,73,14,38,834	67,37,42,49,637	14,79,479	5,76,99,662	6,92,57,553	3,13,90,69,487	59,179	26,92,651	6,60,53,727	2,56,92,45,114	1,184	53,853	1,59,75,46,669	61,72,08,88,194	1,43,13,28,541	55,29,73,70,179	16,62,18,128	6,42,35,18,015
41	1,73,14,38,834	69,10,56,88,470	14,79,479	5,91,79,141	6,92,57,553	3,20,83,27,040	59,179	27,51,830	6,60,53,727	2,63,52,98,841	1,184	55,037	1,59,75,46,669	63,31,84,34,863	1,43,13,28,541	56,72,86,98,720	16,62,18,128	6,58,97,36,143
42	1,73,14,38,834	70,83,71,27,304	14,79,479	6,06,58,619	6,92,57,553	3,27,75,84,594	59,179	28,11,009	6,60,53,727	2,70,13,52,568	1,184	56,220	1,59,75,46,669	64,91,59,81,532	1,43,13,28,541	58,16,00,27,261	16,62,18,128	6,75,59,54,271
43	1,73,14,38,834	72,56,85,66,138	14,79,479	6,21,38,098	6,92,57,553	3,34,68,42,147	59,179	28,70,188	6,60,53,727	2,76,74,06,296	1,184	57,404	1,59,75,46,669	66,51,35,28,201	1,43,13,28,541	59,59,13,55,802	16,62,18,128	6,92,21,72,399
44	1,73,14,38,834	74,30,00,04,972	14,79,479	6,36,17,576	6,92,57,553	3,41,60,99,700	59,179	29,29,367	6,60,53,727	2,83,34,60,023	1,184	58,587	1,59,75,46,669	68,11,10,74,870	1,43,13,28,541	61,02,26,84,343	16,62,18,128	7,08,83,90,527
45	1,73,14,38,834	76,03,14,43,805	14,79,479	6,50,97,055	6,92,57,553	3,48,53,57,254	59,179	29,88,547	6,60,53,727	2,89,95,13,750	1,184	59,771	1,59,75,46,669	69,70,86,21,539	1,43,13,28,541	62,45,40,12,884	16,62,18,128	7,25,46,08,655
46	1,73,14,38,834	77,76,28,82,639	14,79,479	6,65,76,534	6,92,57,553	3,55,46,14,807	59,179	30,47,726	6,60,53,727	2,96,55,67,477	1,184	60,955	1,59,75,46,669	71,30,61,68,208	1,43,13,28,541	63,88,53,41,425	16,62,18,128	7,42,08,26,783
47	1,73,14,38,834	79,49,43,21,473	14,79,479	6,80,56,012	6,92,57,553	3,62,38,72,360	59,179	31,06,905	6,60,53,727	3,03,16,21,205	1,184	62,138	1,59,75,46,669	72,90,37,14,877	1,43,13,28,541	65,31,66,69,966	16,62,18,128	7,58,70,44,911
48	1,73,14,38,834	81,22,57,60,307	14,79,479	6,95,35,491	6,92,57,553	3,69,31,29,914	59,179	31,66,084	6,60,53,727	3,09,76,74,932	1,184	63,322	1,59,75,46,669	74,50,12,61,546	1,43,13,28,541	66,74,79,98,506	16,62,18,128	7,75,32,63,039
49	1,73,14,38,834	82,95,71,99,141	14,79,479	7,10,14,969	6,92,57,553	3,76,23,87,467	59,179	32,25,263	6,60,53,727	3,16,37,28,659	1,184	64,505	1,59,75,46,669	76,09,88,08,215	1,43,13,28,541	68,17,93,27,047	16,62,18,128	7,91,94,81,167
50	1,73,14,38,834	84,68,86,37,974	14,79,479	7,24,94,448	6,92,57,553	3,83,16,45,021	59,179	32,84,442	6,60,53,727	3,22,97,82,387	1,184	65,689	1,59,75,46,669	77,69,63,54,884	1,43,13,28,541	69,61,06,55,588	16,62,18,128	8,08,56,99,295
51	1,73,14,38,834	86,42,00,76,808	14,79,479	7,39,73,926	6,92,57,553	3,90,09,02,574	59,179	33,43,621	6,60,53,727	3,29,58,36,114	1,184	66,872	1,59,75,46,669	79,29,39,01,553	1,43,13,28,541	71,04,19,84,129	16,62,18,128	8,25,19,17,423
52	1,73,14,38,834	88,15,15,15,642	14,79,479	7,54,53,405	6,92,57,553	3,97,01,60,127	59,179	34,02,801	6,60,53,727	3,36,18,89,841	1,184	68,056	1,59,75,46,669	80,89,14,48,221	1,43,13,28,541	72,47,33,12,670	16,62,18,128	8,41,81,35,551
53	1,73,14,38,834	89,88,29,54,476	14,79,479	7,69,32,883	6,92,57,553	4,03,94,17,681	59,179	34,61,980	6,60,53,727	3,42,79,43,568	1,184	69,240	1,59,75,46,669	82,48,89,94,890	1,43,13,28,541	73,90,46,41,211	16,62,18,128	8,58,43,53,680
54	1,73,14,38,834	91,61,43,93,309	14,79,479	7,84,12,362	6,92,57,553	4,10,86,75,234	59,179	35,21,159	6,60,53,727	3,49,39,97,296	1,184	70,423	1,59,75,46,669	84,08,65,41,559	1,43,13,28,541	75,33,59,69,752	16,62,18,128	8,75,05,71,808
55	1,73,14,38,834	93,34,58,32,143	14,79,479	7,98,91,840	6,92,57,553	4,17,79,32,787	59,179	35,80,338	6,60,53,727	3,56,00,51,023	1,184	71,607	1,59,75,46,669	85,68,40,88,228	1,43,13,28,541	76,76,72,98,293	16,62,18,128	8,91,67,89,936
56	1,73,14,38,834	95,07,72,70,977	14,79,479	8,13,71,319	6,92,57,553	4,24,71,90,341	59,179	36,39,517	6,60,53,727	3,62,61,04,750	1,184	72,790	1,59,75,46,669	87,28,16,34,897	1,43,13,28,541	78,19,86,26,834	16,62,18,128	9,08,30,08,064
57	1,73,14,38,834	96,80,87,09,811	14,79,479	8,28,50,797	6,92,57,553	4,31,64,47,894	59,179	36,98,696	6,60,53,727	3,69,21,58,478	1,184	73,974	1,59,75,46,669	88,87,91,81,566	1,43,13,28,541	79,62,99,55,374	16,62,18,128	9,24,92,26,192
58	1,73,14,38,834	98,54,01,48,645	14,79,479	8,43,30,276	6,92,57,553	4,38,57,05,447	59,179	37,57,875	6,60,53,727	3,75,82,12,205	1,184	75,158	1,59,75,46,669	90,47,67,28,235	1,43,13,28,541	81,06,12,83,915	16,62,18,128	9,41,54,44,320
59	1,73,14,38,834	1,00,27,15,87,478	14,79,479	8,58,09,754	6,92,57,553	4,45,49,63,001	59,179	38,17,055	6,60,53,727	3,82,42,65,932	1,184	76,341	1,59,75,46,669	92,07,42,74,904	1,43,13,28,541	82,49,26,12,456	16,62,18,128	9,58,16,62,448
60	1,73,14,38,834	1,02,00,30,26,312	14,79,479	8,72,89,233	6,92,57,553	4,52,42,20,554	59,179	38,76,234	6,60,53,727	3,89,03,19,659	1,184	77,525	1,59,75,46,669	93,67,18,21,573	1,43,13,28,541	83,92,39,40,997	16,62,18,128	9,74,78,80,576
61	1,73,14,38,834	1,03,73,44,65,146	14,79,479	8,87,68,711	6,92,57,553	4,59,34,78,107	59,179	39,35,413	6,60,53,727	3,95,63,73,387	1,184	78,708	1,59,75,46,669	95,26,93,68,242	1,43,13,28,541	85,35,52,69,538	16,62,18,128	9,91,40,98,704
62	1,73,14,38,834	1,05,46,59,03,980	14,79,479	9,02,48,190	6,92,57,553	4,66,27,35,661	59,179	39,94,592	6,60,53,727	4,02,24,27,114	1,184	79,892	1,59,75,46,669	96,86,69,14,911	1,43,13,28,541	86,78,65,98,079	16,62,18,128	10,08,03,16,832
63	1,73,14,38,834	1,07,19,73,42,813	14,79,479	9,17,27,668	6,92,57,553	4,73,19,93,214	59,179	40,53,771	6,60,53,727	4,08,84,80,841	1,184	81,075	1,59,75,46,669	98,46,44,61,580	1,43,13,28,541	88,21,79,26,620	16,62,18,128	10,24,65,34,960
64	1,73,14,38,834	1,08,92,87,81,647	14,79,479	9,32,07,147	6,92,57,553	4,80,12,50,767	59,179	41,12,950	6,60,53,727	4,15,45,34,569	1,184	82,259	1,59,75,46,669	1,00,06,20,08,249	1,43,13,28,541	89,64,92,55,161	16,62,18,128	10,41,27,53,088
65	1,73,14,38,834	1,10,66,02,20,481	14,79,479	9,46,86,625	6,92,57,553	4,87,05,08,321	59,179	41,72,129	6,60,53,727	4,22,05,88,296	1,184	83,443	1,59,75,46,669	1,01,65,95,54,918	1,43,13,28,541	91,08,05,83,702	16,62,18,128	10,57,89,71,216
66	1,73,14,38,834	1,12,39,16,59,315	14,79,479	9,61,66,104	6,92,57,553	4,93,97,65,874	59,179	42,31,309	6,60,53,727	4,28,66,42,023	1,184	84,626	1,59,75,46,669	1,03,25,71,01,587	1,43,13,28,541	92,51,19,12,243	16,62,18,128	10,74,51,89,344
67	1,73,14,38,834	1,14,12,30,98,148	14,79,479	9,76,45,582	6,92,57,553	5,00,90,23,427	59,179	42,90,488	6,60,53,727	4,35,26,95,751	1,184	85,810	1,59,75,46,669	1,04,85,46,48,255	1,43,13,28,541	93,94,32,40,783	16,62,18,128	10,91,14,07,472
68	1,73,14,38,834	1,15,85,45,36,982	14,79,479	9,91,25,061	6,92,57,553	5,07,82,80,981	59,179	43,49,667	6,60,53,727	4,41,87,49,478	1,184	86,993	1,59,75,46,669	1,06,45,21,94,924	1,43,13,28,541	95,37,45,69,324	16,62,18,128	11,07,76,25,600
69	1,73,14,38,834	1,17,58,59,75,816	14,79,479	10,06,04,540	6,92,57,553	5,14,75,38,534	59,179	44,08,846	6,60,53,727	4,48,48,03,205	1,184	88,177	1,59,75,46,669	1,08,04,97,41,593	1,43,13,28,541	96,80,58,97,865	16,62,18,128	11,24,38,43,728
70	1,73,14,38,834	1,19,31,74,14,650	14,79,479	10,20,84,018	6,92,57,553	5,21,67,96,088	59,179	44,68,025	6,60,53,727	4,55,08,56,932	1,184	89,361	1,59,75,46,669	1,09,64,72,88,262	1,43,13,28,541	98,23,72,26,406	16,62,18,128	11,41,00,61,856
71	1,73,14,38,834	1,21,04,88,53,484	14,79,479	10,35,63,497	6,92,57,553	5,28,60,53,641	59,179	45,27,204	6,60,53,727	4,61,69,10,660	1,184	90,544	1,59,75,46,669	1,11,24,48,34,931	1,43,13,28,541	99,66,85,54,947	16,62,18,128	11,57,62,79,984
72	1,73,14,38,834	1,22,78,02,92,317	14,79,479	10,50,42,975	6,92,57,553	5,35,53,11,194	59,179	45,86,383	6,60,53,727	4,68,29,64,387	1,184	91,728	1,59,75,46,669	1,12,84,23,81,600	1,43,13,28,541	1,01,09,98,83,488	16,62,18,128	11,74,24,98,112
73	1,73,14,38,834	1,24,51,17,31,151	14,79,479	10,65,22,454	6,92,57,553	5,42,45,68,748	59,179	46,45,563	6,60,53,727	4,74,90,18,114	1,184	92,911	1,59,75,46,669	1,14,43,99,28,269	1,43,13,28,541	1,02,53,12,12,029	16,62,18,128	11,90,87,16,240
74	1,73,14,38,834	1,26,24,31,69,985	14,79,479	10,80,01,932	6,92,57,553	5,49,38,26,301	59,179	47,04,742	6,60,53,727	4,81,50,71,842	1,184	94,095	1,59,75,46,669	1,16,03,74,74,938	1,43,13,28,541	1,03,96,25,40,570	16,62,18,128	12,07,49,34,368
75	1,73,14,38,834	1,27,97,46,08,819	14,79,479	10,94,81,411	6,92,57,553	5,56,30,83,854	59,179	47,63,921	6,60,53,727	4,88,11,25,569	1,184	95,278	1,59,75,46,669	1,17,63,50,21,607	1,43,13,28,541	1,05,39,38,69,111	16,62,18,128	12,24,11,52,496
76	1,73,14,38,834	1,29,70,60,47,652	14,79,479	11,09,60,889	6,92,57,553	5,63,23,41,408	59,179	48,23,100	6,60,53,727	4,94,71,79,296	1,184	96,462	1,59,75,46,669	1,19,23,25,68,276	1,43,13,28,541	1,06,82,51,97,651	16,62,18,128	12,40,73,70,624
77	1,73,14,38,834	1,31,43,74,86,486	14,79,479	11,24,40,368	6,92,57,553	5,70,15,98,961	59,179	48,82,279	6,60,53,727	5,01,32,33,023	1,184	97,646	1,59,75,46,669	1,20,83,01,14,945	1,43,13,28,541	1,08,25,65,26,192	16,62,18,128	12,57,35,88,753
78	1,73,14,38,834	1,33,16,89,25,320	14,79,479	11,39,19,846	6,92,57,553	5,77,08,56,514	59,179	49,41,458	6,60,53,727	5,07,92,86,751	1,184	98,829	1,59,75,46,669	1,22,42,76,61,614	1,43,13,28,541	1,09,68,78,54,733	16,62,18,128	12,73,98,06,881
79	1,73,14,38,834	1,34,90,03,64,154	14,79,479	11,53,99,325	6,92,57,553	5,84,01,14,068	59,179	50,00,637	6,60,53,727	5,14,53,40,478	1,184	1,00,013	1,59,75,46,669	1,24,02,52,08,283	1,43,13,28,541	1,11,11,91,83,274	16,62,18,128	12,90,60,25,009
80	1,73,14,38,834	1,36,63,18,02,988	14,79,479	11,68,78,803	6,92,57,553	5,90,93,71,621	59,179	50,59,817	6,60,53,727	5,21,13,94,205	1,184	1,01,196	1,59,75,46,669	1,25,62,27,54,952	1,43,13,28,541	1,12,55,05,11,815	16,62,18,128	13,07,22,43,137
81	1,73,14,38,834	1,38,36,32,41,821	14,79,479	11,83,58,282	6,92,57,553	5,97,86,29,174	59,179	51,18,996	6,60,53,727	5,27,74,47,933	1,184	1,02,380	1,59,75,46,669	1,27,22,03,01,621	1,43,13,28,541	1,13,98,18,40,356	16,62,18,128	13,23,84,61,265
82	1,73,14,38,834	1,40,09,46,80,655	14,79,479	11,98,37,760	6,92,57,553	6,04,78,86,728	59,179	51,78,175	6,60,53,727	5,34,35,01,660	1,184	1,03,563	1,59,75,46,669	1,28,81,78,48,290	1,43,13,28,541	1,15,41,31,68,897	16,62,18,128	13,40,46,79,393
83	1,73,14,38,834	1,41,82,61,19,489	14,79,479	12,13,17,239	6,92,57,553	6,11,71,44,281	59,179	52,37,354	6,60,53,727	5,40,95,55,387	1,184	1,04,747	1,59,75,46,669	1,30,41,53,94,958	1,43,13,28,541	1,16,84,44,97,438	16,62,18,128	13,57,08,97,521
84	1,73,14,38,834	1,43,55,75,58,323	14,79,479	12,27,96,717	6,92,57,553	6,18,64,01,834	59,179	52,96,533	6,60,53,727	5,47,56,09,114	1,184	1,05,931	1,59,75,46,669	1,32,01,29,41,627	1,43,13,28,541	1,18,27,58,25,979	16,62,18,128	13,73,71,15,649
85	1,73,14,38,834	1,45,28,89,97,156	14,79,479	12,42,76,196	6,92,57,553	6,25,56,59,388	59,179	53,55,712	6,60,53,727	5,54,16,62,842	1,184	1,07,114	1,59,75,46,669	1,33,61,04,88,296	1,43,13,28,541	1,19,70,71,54,519	16,62,18,128	13,90,33,33,777
86	1,73,14,38,834	1,47,02,04,35,990	14,79,479	12,57,55,674	6,92,57,553	6,32,49,16,941	59,179	54,14,891	6,60,53,727	5,60,77,16,569	1,184	1,08,298	1,59,75,46,669	1,35,20,80,34,965	1,43,13,28,541	1,21,13,84,83,060	16,62,18,128	14,06,95,51,905
87	1,73,14,38,834	1,48,75,18,74,824	14,79,479	12,72,35,153	6,92,57,553	6,39,41,74,495	59,179	54,74,071	6,60,53,727	5,67,37,70,296	1,184	1,09,481	1,59,75,46,669	1,36,80,55,81,634	1,43,13,28,541	1,22,56,98,11,601	16,62,18,128	14,23,57,70,033
88	1,73,14,38,834	1,50,48,33,13,658	14,79,479	12,87,14,631	6,92,57,553	6,46,34,32,048	59,179	55,33,250	6,60,53,727	5,73,98,24,024	1,184	1,10,665	1,59,75,46,669	1,38,40,31,28,303	1,43,13,28,541	1,24,00,11,40,142	16,62,18,128	14,40,19,88,161
89	1,73,14,38,834	1,52,21,47,52,492	14,79,479	13,01,94,110	6,92,57,553	6,53,26,89,601	59,179	55,92,429	6,60,53,727	5,80,58,77,751	1,184	1,11,849	1,59,75,46,669	1,40,00,06,74,972	1,43,13,28,541	1,25,43,24,68,683	16,62,18,128	14,56,82,06,289
90	1,73,14,38,834	1,53,94,61,91,325	14,79,479	13,16,73,588	6,92,57,553	6,60,19,47,155	59,179	56,51,608	6,60,53,727	5,87,19,31,478	1,184	1,13,032	1,59,75,46,669	1,41,59,82,21,641	1,43,13,28,541	1,26,86,37,97,224	16,62,18,128	14,73,44,24,417
91	1,73,14,38,834	1,55,67,76,30,159	14,79,479	13,31,53,067	6,92,57,553	6,67,12,04,708	59,179	57,10,787	6,60,53,727	5,93,79,85,205	1,184	1,14,216	1,59,75,46,669	1,43,19,57,68,310	1,43,13,28,541	1,28,29,51,25,765	16,62,18,128	14,90,06,42,545
92	1,73,14,38,834	1,57,40,90,68,993	14,79,479	13,46,32,546	6,92,57,553	6,74,04,62,261	59,179	57,69,966	6,60,53,727	6,00,40,38,933	1,184	1,15,399	1,59,75,46,669	1,44,79,33,14,979	1,43,13,28,541	1,29,72,64,54,306	16,62,18,128	15,06,68,60,673
93	1,73,14,38,834	1,59,14,05,07,827	14,79,479	13,61,12,024	6,92,57,553	6,80,97,19,815	59,179	58,29,145	6,60,53,727	6,07,00,92,660	1,184	1,16,583	1,59,75,46,669	1,46,39,08,61,648	1,43,13,28,541	1,31,15,77,82,847	16,62,18,128	15,23,30,78,801
94	1,73,14,38,834	1,60,87,19,46,660	14,79,479	13,75,91,503	6,92,57,553	6,87,89,77,368	59,179	58,88,325	6,60,53,727	6,13,61,46,387	1,184	1,17,766	1,59,75,46,669	1,47,98,84,08,317	1,43,13,28,541	1,32,58,91,11,388	16,62,18,128	15,39,92,96,929
95	1,73,14,38,834	1,62,60,33,85,494	14,79,479	13,90,70,981	6,92,57,553	6,94,82,34,921	59,179	59,47,504	6,60,53,727	6,20,22,00,115	1,184	1,18,950	1,59,75,46,669	1,49,58,59,54,986	1,43,13,28,541	1,34,02,04,39,928	16,62,18,128	15,56,55,15,057
96	1,73,14,38,834	1,64,33,48,24,328	14,79,479	14,05,50,460	6,92,57,553	7,01,74,92,475	59,179	60,06,683	6,60,53,727	6,26,82,53,842	1,184	1,20,134	1,59,75,46,669	1,51,18,35,01,655	1,43,13,28,541	1,35,45,17,68,469	16,62,18,128	15,73,17,33,185
97	1,73,14,38,834	1,66,06,62,63,162	14,79,479	14,20,29,938	6,92,57,553	7,08,67,50,028	59,179	60,65,862	6,60,53,727	6,33,43,07,569	1,184	1,21,317	1,59,75,46,669	1,52,78,10,48,324	1,43,13,28,541	1,36,88,30,97,010	16,62,18,128	15,89,79,51,313
98	1,73,14,38,834	1,67,79,77,01,996	14,79,479	14,35,09,417	6,92,57,553	7,15,60,07,581	59,179	61,25,041	6,60,53,727	6,40,03,61,296	1,184	1,22,501	1,59,75,46,669	1,54,37,85,94,992	1,43,13,28,541	1,38,31,44,25,551	16,62,18,128	16,06,41,69,441
99	1,73,14,38,834	1,69,52,91,40,829	14,79,479	14,49,88,895	6,92,57,553	7,22,52,65,135	59,179	61,84,220	6,60,53,727	6,46,64,15,024	1,184	1,23,684	1,59,75,46,669	1,55,97,61,41,661	1,43,13,28,541	1,39,74,57,54,092	16,62,18,128	16,23,03,87,569
100	1,73,14,38,834	1,71,26,05,79,663	14,79,479	14,64,68,374	6,92,57,553	7,29,45,22,688	59,179	62,43,399	6,60,53,727	6,53,24,68,751	1,184	1,24,868	1,59,75,46,669	1,57,57,36,88,330	1,43,13,28,541	1,41,17,70,82,633	16,62,18,128	16,39,66,05,698
T																		
															1,41,17,70,826			

Table #18: Ex post estimated net anthropogenic GHG emission reductions (DREDDt) and Voluntary Carbon Units (VCUt)

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	DRC Forest/Land cover maps
Data unit	ha
Description	Map showing LULC class forest and non-forest at Project start date
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Project Area Forest Cover Benchmark Map
Data unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Project Area at the Project start date (100% forest cover).
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects

	only).
Comments	NA

Data / Parameter	Leakage Belt Forest Cover Benchmark Map
Data unit	ha
Description	Map that shows the stratification of LULC class forest in the Leakage Belt at the Project start date (100% forest cover).
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	ABSLRRt
Data unit	ha
Description	Annual area of baseline deforestation in the reference region.
Source of data	Calculated based on the results from the future deforestation model using standard GIS software.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description of measurement	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.

methods and procedures applied	
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	ABSLPAt
Data unit	ha
Description	Annual area of baseline deforestation in the reference region.
Source of data	Calculated based on the results from future deforestation models using standard GIS software.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	ABSLLKt
Data unit	ha
Description	Annual area of baseline deforestation in the reference region.
Source of data	Calculated based on the results from future deforestation models using standard GIS software.
Value applied	Variables and procedures used for calculation are explained in Annex3
Justification of choice of data or description	The data is available to the public free of charge. Details about data pre and post-processing can be found in

of measurement methods and procedures applied	Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Ctoticl
Data unit	t CO2-e ha-1
Description	Average carbon stock of all accounted carbon pools in forest class icl
Source of data	Calculated based on the results from future deforestation models using standard GIS software.
Value applied	Dense Forest Sparse Forest
Justification of choice of data or description of measurement methods and procedures applied	The inventory was carried out in 97 plots of forest comprising two classes namely dense forest and sparse forest within an area that encompasses the Project Area and Leakage Belt. A detailed report can be found in Annex 5 but as a summary the following are the highlights of the report: - Sampling plots were randomly located in forest stratum - DBH (Diameter at Breast Height) was measured for all the trees in a plot - Trees biomass was determined using Overman et.al. 1994 equation which was successfully tested nearby the Project Area by expert team.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	fj(DBH)ab

Data unit	t d.m. tree-1
Description	Allometric equation for species j linking DBH to aboveground biomass of living trees expressed as t d.m. tree-1
Source of data	Overman's 1994 equation Overman
Value applied	Dense Forest Sparse Forest
Justification of choice of data or description of measurement methods and procedures applied	Above-ground biomass for a DBH ≥ 10cm was calculated using Overman's equation (Overman Witte et al. 1994) corrected for biomass moisture content (Araujo Higuchi et al. 1999). Araujo tested Overman's equation in a location 250Km from Belem in Para (close to the Project Area under the same forest type) obtaining predicted results within ±0.6% of the weight determined in the field through destructive sampling.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	LULC-Change
Data unit	%
Description	Percentage of forest that change to non-forest final classes during the historical reference period.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Dense Forest Sparse Forest
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.

Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Cpiclt
Data unit	t CO2-e ha-1
Description	Percentage of forest that change to non-forest final classes during the historical reference period.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Dense Forest Sparse Forest
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Map of Forest / non-forest cover bench map
Data unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Project Area at the Project start date (100% forest cover)
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Forest Non-Forest

Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Project Area forest cover bench map
Data unit	ha
Description	Map showing LULC class – Forest and non-forest at project start date.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	Dense Forest Sparse Forest
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	RFt
Data unit	%
Description	The risk factor used to calculate VCS buffer credits.
Source of data	AFOLU Non-Permanence Risk Tool v3.1
Value applied	The value was calculated as a result of applying the

	Guidelines in the aforementioned Tool.
Justification of choice of data or description of measurement methods and procedures applied	Each renewal of a fixed baseline period.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

Data / Parameter	Map of Distance to selective logging form tertiary roads
Data unit	Km
Description	The average distance from tertiary roads to areas presenting selective logging
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	km
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA
Data / Parameter	Map of Distance to Rivers
Data unit	Km
Description	Raster map of distances from navigable rivers in the RRD.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	km

Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	NA

Data / Parameter	Map of Distance to Roads
Data unit	Km
Description	Raster map of distances from navigable rivers in the RRD.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	km
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	NA

Data / Parameter	Map of Distance to non-forests
Data unit	Km
Description	Raster map of distances from navigable rivers in the RRD.
Source of data	Landsat Imagery for 2001 2006 2011 and 2016 obtained from Google Earth Engine.
Value applied	km
Justification of choice of data or description of measurement	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found

methods and procedures applied	in Annex 3.
Purpose of Data	Determination of baseline scenario (AFOLU projects only)
Comments	NA

Data / Parameter	EI
Data unit	%
Description	Ex ante estimated Effectiveness index
Source of data	Calculated
Value applied	km
Justification of choice of data or description of measurement methods and procedures applied	Based on results from ongoing on-site monitoring activities since 2008.
Purpose of Data	Determination of baseline scenario (AFOLU projects only).
Comments	NA

3.3.2 Data and Parameters Monitored

Data / Parameter	DRC Forest/Land cover maps
Data unit	ha
Description	Monitor land cover and land-use change using appropriate remote sensing data.
Source of data	Remote Sensing data (Landsat data).
Description of measurement methods and procedures to be applied	The variables and procedures used for calculation are explained in Annex3.
Frequency of	Land use land cover changes are monitored Annually.

monitoring/recording	
Value applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Monitoring equipment	Standard GIS/Digital image processing software will be used.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied including the calibration procedures where applicable.
Purpose of data	Determination of baseline scenario (AFOLU projects only).
Calculation method	Where relevant provide the calculation method including any equations used to establish the data/parameter.
Comments	NA

3.3.3 Monitoring Plan

1. Monitoring changes in carbon stock and GHG emissions for verification
    a. Monitoring actual changes in carbon stocks and GHG emissions in the project area;
    b. Monitoring leakage;
    c. Ex-post calculation of GHG emission reductions;
    d. Monitoring the impacts of natural disturbances and other catastrophic events.

1.1 Monitoring actual changes in carbon stocks and GHG emissions in the project area.

1.1.1 **Monitoring the implementation of the project** – The KMS with the active participation of relevant chief's village heads and patrolling teams the effective implementation and monitoring of the conservation and project implementation is achieved.

The activities of the Project and their monitoring can be group as follows:

1. Forest and Biodiversity monitoring: will be conducted by forest monitoring patrols on frequent intervals. They will be responsible for each monitoring patrol who will generate yearly activities reports unless illegal activities are spotted in which case a report should be submitted immediately as described in the next section.

Team leaders will compile adequate information in digital format from the reports to keep track of the areas that are being patrolled each week and what are the findings of each patrol. This ground information will be complemented with monthly or bi-monthly Landsat 8 imagery that will also serve as a means of verifying the effectiveness of the monitoring patrols.

On a monthly basis Team leaders will perform random site visits to verify that monitoring patrols are covering the assigned area and that each patrol is wearing adequate field equipment. Team leaders should fill up a report that will be submitted to the KMS office in Bangalore. A monitoring patrol that does not wear adequate field equipment or does not cover the designed monitoring route will receive a warning. If a patrol is a re-offender the patrol leader will be immediately replaced. Maps Reports and records will be available to validators at each verification event.

2. Social Monitoring: Under every chief's there is a squad of people who do social monitoring and supervised by the KMS team representatives.

Monthly reports will be submitted to the brigade leader who will input the information into electronic format to analyze it. The results from this analysis will be used to assess the impact of each activity and to identify villages that require particular attention.

The Project management teams in DRC and Bangalore headquarters will hold quarterly meetings to assess the effectiveness of the activities in local villages. Based on the information supplied by the local leaders the management teams will improve the proposed activities. Maps Reports and records will be available to external auditors at each verification event.

1.2 **Monitoring change and land use within the project area** - This task will be the responsibility of the KMS group. According to the categories presented in Table 35 of the VM0015 methodology, the Project will implement MRV to identify and assess LULC-changes within the Project Area due.

Sl.No	Type	Conditions under which monitoring is mandatory	Explanations	Applicability to the Project
1	Area of forest land converted to non-forest land.	Mandatory in all AUD project activities.		
2	Area of forest land undergoing carbon stock decrease.	Mandatory in all AUD project activities.	Change in carbon stock must be significant according to ex-ante assessment otherwise monitoring is not required.	Does not apply because any of the Project's Activities involve planned logging fuel-wood collection and charcoal production.
3	Area of forest land undergoing carbon stock increases.	Mandatory in all AUD project activities.	Change in carbon stock must be significant according to ex-ante	Does not apply because the project will not claim carbon credits from carbon

			assessment.	stock increase.

To assess LULC-change from forest land to non-forest land the Project will use LANDSAT 8 imagery and/or radar imagery to generate annual deforestation data throughout the Reference Region using the protocol described in detail in Annex 3. This analysis will generate classes of forest and non-forest updated every year and will be compared with previous years. Deforestation estimates obtained from this analysis will be compared with the deforestation model designed using QGIS software that was used to establish the baseline scenario in the region of interest and differences between projected and observed values will be presented for every year. Of particular importance is the implementation of the surveillance system that will allow continuous monitoring of the Project Area to prevent the entry of squatters and illegal loggers. The Project Area will be divided into crews to facilitate monitoring such a large area. Initially brigades will be constituted by a technician specialized in forestry topics that will function as a manager (it is expected that technicians will not belong to the villages) and a group of villagers as a patrol. With time and as experience is gained it is expected that brigades managers will be chosen from local villages. Representative chiefs to play a key role in planning and managing the activities along with KMS.

The actual size of a crew and the number of villagers to be hired depends on the results from the census that will be conducted after validation. The area of a brigade will need to be a reasonable one to allow for effective surveillance given available staff. If not enough local villagers are willing to work as monitoring staff; KMS will hire NGO teams.

Crews will identify and report any illegal activities (invasions and timber extraction) to the crew leader. If illegal activities are spotted crews should geo-reference the finding and make a short Description of what was found. Crews should approach squatters or loggers to let them know – in good terms- that this is community they cannot undertake such activities there and they should leave immediately.

With the information supplied by each patrol brigade leaders will fill –up a monitoring report that will include at least the coordinates where the illegal activities are taking place the date and a brief report of what was identified. If necessary relevant activities including the illegal activities will be informed.

Monitoring reports should be numbered and filed appropriately. Once in a month monitoring reports shall be scanned to have digital copies in an archive as a backup. Maps Reports and records will be available to validators at each verification event.

1.2.1 Monitoring of carbon stock changes and non-CO2 emissions from forest fires

Destruction to Carbon stock and non-co2 emissions are monitored through Landsat data or in other words Remote Sensing techniques and field sampling in the affected areas.

1.2.2 Monitoring of the impacts of natural disturbances and other catastrophic events.
Catastrophic events are not expected in the Project Area or Leakage Belt. Nevertheless if by any chance a catastrophic event presents during the Project's lifetime such events will be evaluated and reported if significant. Monitoring will follow VM0015 Tables 20.f 20.g 21.f and 21.g to report reductions by catastrophic events.

Total ex-post estimated actual net carbon stock changes and GHG emissions in the project area. All ex-post estimations in the Project Area will be summarized using the format of Table 24 of the VM0015 methodology.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

A monitoring plan for climate benefits along with the monitoring plan and results will be communicated to the communities and other stakeholders. Majority information undertaken will be available on internet in the form of modern reports and in other forums from time to time.

3.4 Optional Criterion: Climate Change Adaptation Benefits

The regional and sub-regional climate changes scenarios using regional climate models or empirical downscaling have been constructed for Africa is significantly less which is due to lack of manpower and sufficient data sets (Parry et al., 2007). A few existing regionally downscaled models are focused on tropical East Africa while on the other hand, the Central African dataset are few. The global climate models Projections of future climate change and related impacts among the most widely used i.e., CMIP5 models included in the IPCC's 5th assessment report (AR5) which suggests the possible climate change in the Project area. The model Projections indicate that the mean annual temperature increase may range between 1.720c and 2.080c by the 2060s and between 2.690c & 3.220c by 2090. The Projected rates of warming are greatest in the coolest season; June-August temperature is projected to increase by 1.50c to 5.4°C by the 2090s. Further, Projections of the rainfall are broadly consistent in indicating increases in mean annual rainfall ranging from -4 to +8% by 2030s. The Projected increase in the rainfall indicates maximum increases of up to 8% during June-August and a reduction of 4% during September-November. Further the increase in the range of precipitation from 0 to 16% in annual average rainfall by the 2090s and affect the whole country throughout the year. Rainfall amounts are projected to increase by 0.3 to 1.5% by 2050. The analysis presented here is the ensemble mean of 16 Global Circulation models.

As described in the other sections of the Project description the with-out Project scenario would result in the underdevelopment of the communities without education and healthcare facilities. Biodiversity too would be significantly impacted as a result of various land-use activities which eventually lead to deforestation. The Projected climate change as presented indicates great stress on the well-being of the communities in the Project area and on the biodiversity of the area under this scenario.

3.4.1 Regional Climate Change Scenarios (GL1.1)

The likely regional climate change variability and risks mentioned above (Section 3.5) are equally applicable to the Project area and Project zone and are likely to have an impact on the wellbeing of communities.

3.4.2 Climate Change Impacts (GL1.2)

The Objective of the KMS REDD+ Project is to achieve net positive impact on the baseline community conditions in the Project zone. The cause and effect logic behind how these long-term impacts will be achieved are presented in the theory of change model below and reflect the guidance found in the Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects.

The baseline scenario for communities in the Project zone is one of lack of access to resources, and of a lack of facilities such as infrastructure, education, and medical care within this region. The communities in the area mainly rely on their own resources to realize access to basic needs for improved quality of life. The opportunity to make sufficient money to purchase these goods and services in the private market is not present in the zone of the Project. Community members can realize a livelihood by unsustainable use of the forest resources in the area. Income from those activities is not enough to pay reliably for the schooling, assets to add value to forest products, or medical care necessary to improve quality of life. Ultimately, even that living is unsustainable as the resources of the forest are exhausted. The baseline scenario for communities in the project area is thus of increasing scarcity of the forest resources in which their living is predicated, and increasing poverty. In this context, KMS initiatives in this area, designed as they are to grow human capacity and improve the long-term opportunity for the people in the Project area will have a net positive impact.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

With Project scenario will increase the socio-ecological resilience, reduce the vulnerability and improve the adaptation capacity through a better management of the natural resources, including adaptive management. In addition to this, forest protection in the Project area will provide a healthy ecosystem with much greater adaptation potential to climate change, with a higher resistance and recovery capability to extreme meteorological phenomena and a wide range of benefits to the people. Within the project area and the neighbourhood.

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

The Democratic Republic of Congo is having the second-largest tropical rainforest in the world and located in Central Africa is inhabited by 70 million people approximately and 150 distinct ethnic groups many of whom are dependent shifting agriculture, hunting and firewood from forests. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana, and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow a fallow period of 5-20 years depending upon soil conditions, land availability, and other factors, and returned to clear and cultivate again. The palm oil generation is native to the African rainforests. About 2.6 million hectares of land across central and western Africa designated under palm cultivation hence, humid forests are under risk. The most likely land use scenario without the Project has the following features, the same that have been projected by local households.

From these analyses we can come to the following conclusions about the without Project scenario:

- More agriculture areas using slash and burn methods
- Increase in the bush meat sales and consumption
- Lack of health care facilities
- Lack of schooling infrastructure facilities
- Lack of clean drinking water to the villages
- Food security issues

The KMS REDD+ Project intends to and/or protect the humid forests through REDD+ project actitivites to enchance the quality of the community by providing various facilities to the community. The facilities include distribution of energy efficient cookstoves, refurbishments and maintainence of health centres, renovations of the education infrastructure facilities, provide drinking water to the deserving communities, enhanced food security to the community members through construction of fish pond and vegetable seeds, regular monitoring and patrolling of the biodiversity through community involvement. These activities has enhanced the quality of life among the community members.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

According to the standard CCB definition, specific groups within communities that can be distinguished are referred to as “community groups”, but due to the size of our defined communities we do not have any community groups in our Project zone. As we do not have community groups, we do not have any interactions between communities and community groups. All village population is considered as a community group and regular interactions are held.

4.1.3 High Conservation Values (CM1.2)

HCV1. In Project area, the forest area support several regionally, nationally and internationally significant, concentration of biodiversity this includes several flora and fauna which coexists with human for several hundreds of years. Some of the highly valueable species that exits are Eastern low-land gorilla (Gorilla beringei graueri), Eastern chimpanzee (Pan troglodytes schweinfurthii) and Congo Peacock (Afropavo congensis). l’Hoest’s Monkey (Allochrocebus lhoesti), Dryas monkey (Cercopithecus dryas) Grauer’s gorilla (Gorilla beringei graueri) and the eastern chimpanzee (Pan troglodytes schweinfurthii)..

HCV2. The Project area is part of the world’s second largest tropical humid rain forests after Amazon the entire landscape is composed of old growth forests over hundreds of years with over 600 species of trees. These forested landscapes, has received global attention as these can sequester carbon to a great extent. The huge forested landscape is home to Mammal’s: 31 species Birds 36 species, Reptiles 4 species, Amphibians 13 species, Fishes 84 species, Molluscs 43 species, Plants 95 species.

HCV3. The forested landscape contains several rare, threatened or endangered species. Which are threatened mainly due to land use activities such as mining, slash and burn agriculture, construction of logging roads, and commodity based urbanization. These develpments has damaged the habitats of several endemics species such as Bonobo, Dyras monkey, Gorilla, Chimapnzee, okapi and various floras to threatened catergory.

HCV4. The Congo River, formerly Zaire River is the chief drainage system in REDD+ Project area. It raises in the Katanga plateaus and flows north and south in a great arc crossing the equator line. The river flow's southwest to join the Atlantic Ocean near Matadi and Banana. It is second longest and deepest river in the world. In Sankuru province, the chief rivers are Sankuru, Lomami, Lubefu and Lukenie. The chief rivers of Tshopo is Congo river, Lomami and Yambuya, The Tshuapa river is the chief hydro source of Tshuapa and in Equateur the major river is Congo and Lulonga (World Bank, 2017). The overall length of the Congo River is 4380km thus making second longest river in the world. The Uele forms at the confluence of the Dungu and Kibali rivers which originates in the mountains near Lake Albert. These rivers join Mbomou River at Yokoma after travelling around 750 miles. The main tributaries to the Uele river are Bomokandi River and Uere River.

HCV5. Over hundreds of years local's depends on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow fallow period of 5-20 years depending upon soil conditions, land availability and other factors, and returned to clear and cultivate again.

HCV6. Traditionally, the people of this area are called as forest people. They are dependent on the forest resources for their survival, housing and food. These groups are managed by the leaders often called as "Chief". These groups of people or communities are normally belong to various beliefs.

4.1.4 Without-Project Scenario: Community (CM1.3)

During the community workshops, the Project team identified and prioritized the focal issues, they then analysed them further to establish the causal logic leading to the problems. The key drivers of the issues identified using the situation analysis of the issue that represents stakeholders' understanding of what drives the existence of the focal issue; it identifies economic, political, institutional, social, and/or cultural factors that contribute to existence of the issue. The key issues with-out Project scenario are: Forest destruction and land encroachment, wildlife poaching, poor community livelihoods, commodity driven urbanization, un-sustainable agriculture practise which influence the well-being of the community which directly/indirectly translates to change in sustainable land-use. The three focal issues identified are: 1) poor livelihoods, 2) forest destruction and encroachment and 3) Wildlife poaching and Biodiversity degradation.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: All children in the school going age in the community.
Impact(s)	Better access to educational infrastructure
Type of Benefit/Cost/Risk	Long term benefits by refurbishment of educational facilities
Change in Well-being	Enhanced quality of life

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: All participants in the training and awareness programmes. Particularly people in decision making and governance roles such as chiefs and village elders.
Impact(s)	Improved natural resource management, and overall improvement in environmental governance
Type of Benefit/Cost/Risk	Training and awareness programmes
Change in Well-being	Improved knowledge, enhanced awareness

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: Unemployed section of the community
Impact(s)	Employment opportunities and improvement in livelihood
Type of Benefit/Cost/Risk	Long term benefits related to direct / indirect employment in project activities such as climate and biodiversity conservation.

Change in Well-being	Enhanced livelihood

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: All community members who do not have access to adequate health facilities and are vulnerable to diseases. Especially the poor community.
Impact(s)	Improved response time in treatment of illness and such facilities can treat more number of patients.
Type of Benefit/Cost/Risk	Refurbishment / Maintenance of Health care facilities
Change in Well-being	Overall Better quality of life and improvement in health

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: All community members who do not have access to adequate nearby safe water resources and are vulnerable to water borne diseases.
Impact(s)	Reduction in number of water borne diseases in the community. Saves time as community does not need to travel far for their water needs.
Type of Benefit/Cost/Risk	Long terms benefit of access to safe drinking water sources
Change in Well-being	Overall Better quality of life and improvement in health

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: Women, Men and Children who lack access to improved cooking facilities. Particularly beneficial to women of the community who are identified as vulnerable.
Impact(s)	Save time on the amount of firewood collected and the indoor air quality will also improve which will decrease indoor air pollution related diseases. Cooking will not be impact in rainy season also.
Type of Benefit/Cost/Risk	Long terms benefit of access to improved cooking practices
Change in Well-being	Overall Better quality of life and improvement in health

Community Group	Local communities (Bantu and Pygmies). Under the broad category of the communities, the following categories are further subdivided: Community members who are entirely or partly dependent upon wildlife for food and practice hunting. Community who practices farming. Women, Men and Children who do not have access to sufficient source of nutrition and lack adequate food security.
Impact(s)	Provide enhanced food security and improved agricultural practices. Hunting wildlife is also expected to decrease.
Type of Benefit/Cost/Risk	Long term benefits of promoting community fish ponds and distribution of vegetable seeds.
Change in Well-being	Enhanced livelihood

4.2.2 Negative Community Impact Mitigation (CM2.2)

There are no negative community impacts and hence there is no need for mitigation.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

Following are the net positive impacts on the community well-being.

- Better forest governance
- Better wildlife and biodiversity governance
- Better health due the use of improved cook stoves especially for women and children
- Better health care facilities especially for women and children
- Better educational facilities especially for women and children

4.2.4 High Conservation Values Protected (CM2.4)

As mentioned in the section 4.1.3 the entire area of KMS REDD+ Project area has high conservation value. KMS REDD+ Project team monitor on a regular basis for any negative impact and mitigate it in a timely manner.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

The Project is designed to generate only positive impacts to the stakeholders living in the Leakage Management Area and it won't generate impacts to those living outside the 3Km buffer

identified during the meetings. No other stakeholders have been identified to use or depend from the resources in the Project's Area or leakage management area.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

There are no negative impacts on other stakeholders, and therefore no mitigations are required. This section is not applicable.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

As there are no negative impacts on other stakeholders. The Project is designed to generate only positive impacts to the stakeholders living in the Leakage Management Area and it won't generate impacts to those living outside the 3 km buffer identified during the Participatory Resource Assesment. No other stakeholders have been identified to use or depend from the resources in the Project's Area or leakage management area.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

Identified Beneficiaries in the community	Quantifiable parameters	Responsibility for monitoring and results	Periodicity of monitoring
All the participants in the training program. Particular benefits to people in decision making and governance roles such as chiefs and village elders.	Number of males and females trained and number of trainings conducted. Training programs to target decision makers, marginalized community and common public in the community.	Provincial focal point/country in-charge. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually
Community members include Women, Men and Children who lack access to improved cooking facilities. Particularly beneficial to women of the community who are	Survey based on number of cook stoves distributed and in operation. Periodic monitoring of usage, maintenance and feedback. Overall benefits to each family will be monitored.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually

identified as vulnerable			
All children in the school going age in the community.	Survey of Children attending school in each village. Number of schools refurbished and type of renovation undertaken will be monitored.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually
All community members who do not have access to adequate health facilities and are vulnerable to diseases. Especially the poor community.	Survey of Community members benefited from the health facilities at each village. To target vulnerable community such as poor community. Number of health facilities and types of diseases treated.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually
All community members who do not have access to adequate nearby safe water resources and are vulnerable to water borne diseases.	Survey of Community members benefited from the improved access to safe water at each village. Number of bore wells installed and in operation. Maintenance and operation of bore wells.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually
Community members who are unemployed	Number of people directly or indirectly benefited from employment generated by project such as in the patrolling and survey activities. To be monitored at the province level.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually

Community members who are entirely or partly dependent upon wildlife for food and practice hunting. Community who practice farming. Women, Men and Children who do not have access to sufficient source of nutrition and lack adequate food security.	Number of people, particularly farmers who are benefited from the improved agricultural practices. Area of farming under the improved farming methods will be monitored. To target vulnerable community such as poor community which lack food security.	Provincial focal point. Results recorded in the Monitoring Report.	Implemented throughout project implementation period. Monitored annually

4.4.2 Monitoring Plan Dissemination (CM4.3)

The KMS REDD+ Project will disseminate the monitoring plan and the results of the monitoring plan every quarter to the community from the start of the project. These documents will be publicly available on the internet on VERRA website at CCB and VCS weblinks. They will also be communicated to the communities and other stakeholders (including the Government and Local Authorities) using diverse media including presentations, reports, brochures, radio announcements and orally during community awareness and sensitization meetings, and annual review meetings.

4.5 Optional Criterion: Exceptional Community Benefits

The KMS REDD+ Project intend to seek Gold level status under the CCB standard based on exceptional community benefits. Following are the acitivities implemented and/or intend to do to enhance the well-being of the communities. This enables KMS REDD+ Project to seek Gold Level Status.

4.5.1 Exceptional Community Criteria (GL2.1)

According to United Nations Development Program (UNDP) assessment, the Democratic Republic of Congo has been rated as low human development country having an index of 0.459 and rank 179 globally. The DRC also has poverty rate of 72.0 % (as stated by the World Bank in 2018. Please refer to https://www.worldbank.org/en/country/drc/overview) of the communities below the national poverty line. This statistic, allows KMS REDD+ Project to be considered under the Gold level criteria.

Figure #10 – The global map representing Human Development Index categories based on 2017 data, by United Nations Development Program (UNDP).

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

Short-term Benefits

The Project has planned to implement distribution of energy efficient cook stoves for deserving community members. The community have been trained in the use of efficient improved cooking stoves and the number of improved cooking stoves pilots implemented in local families is part of the monitoring plan. This ensures capacity building related to efficient and improved cooking stoves, improvement in health especially for women and Improvement in overall satisfaction and health of the community. This activity reduces the firewood consumption as cook stoves are more efficient compared to open stoves.

Long-term Benefits

The Project will continue to distribute energy efficient cook stoves for deserving community and provide training to use the cook stoves. This ensures capacity building related to efficient and improved cooking stoves, improvement in health especially for women and Improvement in overall satisfaction and health of community. This activity reduces the firewood consumption as cook stoves are more efficient compared to open stoves. The community will get enhanced medical facilities through construction of new and/or renovation of existing health centres. The

community will experience enhanced education facilities through construction and/or renovation of educational infrastructure. In addition, the communities will also get enhanced food security through fish pond creation, and vegetable seed distribution.

4.5.3 Community Participation Risks (GL2.3)

The Project has very low risk where community or Chiefdoms are opting out of the KMS REDD+ Prorject. To ensure any such events regular meetings and / or two way interaction / discussion with the communities and their respective Chiefdoms adhered throughout the Project life time and ensure that community will not opt out of the Project. All grieveances of communities if any will be amicable resolved by the respective Chiefs / Government officials and KMS representatives.

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

KMS REDD+ Project conducted survey and found that there are more than 150 ethnic group in the Democratic Republic of Congo therefore, it's imperative to mention all the groups but would like to address as Local Communities. The Bantu Group which constitutes about 80% of are the majority whereas the Pygmies are the minority constituting around 1% of the total population.

Community Group	Local Communities (Bantu and Pygmy)
Net positive impacts	Improved education, awareness training, improved health care, protein resources and clean drinking water.
Benefit access	This Project is intending to develop positive results and has not noticed any barrier's and/or to any communities in accessing the benefit.
Negative impacts	This Project has not noticed any negative impacts on these communities.

4.5.5 Net Impacts on Women (GL2.5)

The KMS REDD+ Project is designed, maintained and executed keeping in view of special attention to women of the Project area. They will give due importance, authorities, and freedom to think, participate and execute in all the activities that KMS REDD+ Project identified. Further,

the women were trained on the use of energy efficient cookstoves is positive as it saves time and do improve the health of the women. The health care creation or rehabilitation or maintenence intiative such as health centre too have positive impact on the women due enhanced health. The women will have enhanced food security by the activity fish pond creation and/or vegetable seed distribution. Providing good drinking water facility to the deserving community will have positive impact. Construction/renovation of educational institutes also will have poisitive impact on the women.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

The revenue generated from the Project through Carbon credits sales are utilised for the implementation of the Project which relating to the distribution of cook stoves, health care facilities, providing clean drinking water; enhancement of the food security, enhancement of the educational facilities, office maintenance in various locations, staff management, training & development of community, staff, experts management etc.

The communities participated in the stakeholder meetings have discussed the benefit sharing mechanism with respective Chiefs, and KMS representatives. Accordingly, the national ministry for Environment and sustainable developments has issued an order dated 4th June 2018 regarding the distribution and sharing percentages of co-benefits arising out of the sale of the carbon credits from this REDD+ project between the Local Communities, National Government, respective local Chiefdom/Sector, and the Project developer/Investor KMS.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

The benefits, costs, and risks has been communicated through KMS representative in host country to all the Chiefs in various gatherings and formal meetings. The Chief's in turn will communicate to the relevant community members / smallholders and other relevant stakeholders on a continuous basis about the benefits, loss, risks and responsibilities involved. Radio announcements are made as necessary from time to time.

4.5.8 Governance and Implementation Structures (GL2.8)

The Project has a very broad governance structure, which includes communities, KMS representatives, Chiefs, and Government officials. All relevant people are involved actively in decision making related to project and its successful implementation.

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

The Project is designed to enhance the capacity of the various community members including Chief doms, women and children. This is mostly accompolished by the training and sensitization conducted by KMS respresentatives.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The Democratic Republic of Congo the second largest tropical rainforest in the world located in the Central Africa is home to mountain gorillas, lowland gorillas, chimpanzees, forest Elephants and over 1000 species of birds such as pelicans, parrots, many species of sunbirds, pigeons, ducks, geese, eagles, vultures, cuckoos, Owls, cranes, storks, and swallows. Insects are innumerable. There are hundreds of butterfly species; in the savanna woodlands, butterflies fill the skies at the beginning of the rains. There are also numerous varieties of bees, grasshoppers, caterpillars, praying mantises, beetles, dragonflies, scorpions, mosquitoes, tsetse flies, ants, termites, spiders, centipedes, and millipedes. The widespread poverty, conflict and economic dependence on mineral extraction is putting pressure on the country's spectacular biodiversity with poaching, deforestation and soil erosion threating wildlife and habitats.

5.1.2 High Conservation Values (B1.2)

HCV1. In Project area, the forest area support several regionally, nationally and internationally significant, concentration of biodiversity this includes several flora and fauna which coexists with human for several hundreds of years. Some of the highly valueable species that exits are Eastern low-land gorilla (Gorilla beringei graueri), Eastern chimpanzee (Pan troglodytes schweinfurthii) and Congo Peacock (Afropavo congensis). l'Hoest's Monkey (Allochrocebus lhoesti), Dryas monkey (Cercopithecus dryas) Grauer's gorilla (Gorilla beringei graueri) and the eastern chimpanzee (Pan troglodytes schweinfurthii)..

HCV2. The Project area is part of the world's second largest tropical humid rain forests after Amazon the entire landscape is composed of old growth forests over hundreds of years with over 600 species of trees. These forested landscapes, has received global attention as these can sequester carbon to a great extent. The huge forested landscape is home to Mammal's: 31 species Birds 36 species, Reptiles 4 species, Amphibians 13 species, Fishes 84 species, Molluscs 43 species, Plants 95 species.

HCV3. The forested landscape contains several rare, threatened or endangered species. Which are threatened mainly due to land use activities such as mining, slash and burn agriculture, construction of logging roads, and commodity based urbanization. These develpments has damaged the habitats of several endemics species such as Bonobo, Dyras monkey, Gorilla, Chimapnzee, okapi and various floras to threatened catergory.

HCV4. The Congo River, formerly Zaire River is the chief drainage system in REDD+ Project area. It raises in the Katanga plateaus and flows north and south in a great arc crossing the equator line. The river flow's southwest to join the Atlantic Ocean near Matadi and Banana. It is second longest and deepest river in the world. In Sankuru province, the chief rivers are Sankuru, Lomami, Lubefu and Lukenie. The chief rivers of Tshopo is Congo river, Lomami and Yambuya, The Tshuapa river is the chief hydro source of Tshuapa and in Equateur the major river is Congo and Lulonga (World Bank, 2017). The overall length of the Congo River is 4380km thus making second longest river in the world. The Uele forms at the confluence of the Dungu and Kibali rivers which originates in the mountains near Lake Albert. These rivers join Mbomou River at Yokoma after travelling around 750 miles. The main tributaries to the Uele river are Bomokandi River and Uere River.

HCV5. Over hundreds of years local's depends on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow fallow period of 5-20 years depending upon soil conditions, land availability and other factors, and returned to clear and cultivate again.

HCV6. Traditionally, the people of this area are called as forest people. They are dependent on the forest resources for their survival, housing and food. These groups are managed by the leaders often called as "Chief". These groups of people or communities are normally belong to various beliefs.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

This widespread poverty, recurring conflict and economic dependence on mineral extraction is putting unprecedented pressure on the country's spectacular biodiversity, with poaching, pollution, deforestation and soil erosion all threatening wildlife and habitats. On the other hand due to severe human pressures as majority of the population fall on below poverty line will continue their dependency on the Wildlife meat as protein resource, poaching and sale of wildlife product for quick money. This activity will lead to permanent destruction of wildlife and its habitat. This is equally applicable to the KMS Monitored trigger species "Okapi". The IUCN classifies the okapi as endangered as there was steady decline a steady decline in numbers due to several threats. The major threats include habitat loss due to logging and increasing human settlement. Extensive hunting for bushmeat & skin, and illegal mining have led to the decline in the population of trigger species. A threat that has emerged quite recently is the presence of illegal armed groups around protected areas, inhibiting conservation and monitoring actions. On June 2012, a gang of poachers attacked the Okapi Wildlife Reserve and killed14 Okapis.

(https://news.mongabay.com/2014/04/okapi-killing-warlord-shot-dead-in-the-democratic-republic-of-the-congo/).

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Okapia johnstoni
Estimated Change	There is 2-4% increase in the sightings of the Okapi as per the monitoring.
Justification of Change	Due to frequent monitoring and patrolling, the number of sightings have increased in the project areas.

Biodiversity Element	Pan troglodytes
Estimated Change	Expected increase or stable population of Pan troglodytes due to monitoring.
Justification of Change	Due to frequent monitoring and patrolling, the number of sightings has increased in the project areas.

Biodiversity Element	Pan paniscus
Estimated Change	Expected increase or stable population of Pan paniscus due to monitoring.
Justification of Change	Due to frequent monitoring and patrolling, the number of sightings has increased in the project areas.

5.2.2 Mitigation Measures (B2.3)

The KMS REDD+ Project activities include patrolling, monitoring and reporting activities to prevent and remove land grabbers and illegal logging activities (thus stopping the first stages of the deforestation process) have been happening on the ground with the participation of that the local communities, villagers and KMS representatives as necessary. These activities help ensuring that the local biodiversity is protected and that their ecosystems are not fragmented.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

Net impacts on biodiversity resulting from the Project activity are expected to be positive, as outlined in the baseline scenario. Net positive impacts on biodiversity will be demonstrated over time through periodic monitoring and reporting of biodiversity indicators as per the Biodiversity Monitoring Plan.

5.2.4 High Conservation Values Protected (B2.4)

HCV1. In Project area, the forest area support several regionally, nationally and internationally significant, concentration of biodiversity this includes several flora and fauna which coexists with human for several hundreds of years. Some of the highly valuable species that exits are Eastern low-land gorilla (Gorilla beringei graueri), Eastern chimpanzee (Pan troglodytes schweinfurthii) and Congo Peacock (Afropavo congensis). l'Hoest's Monkey (Allochrocebus lhoesti), Dryas monkey (Cercopithecus dryas) Grauer's gorilla (Gorilla beringei graueri) and the eastern chimpanzee (Pan troglodytes schweinfurthii).

HCV2. The Project area is part of the world's second largest tropical humid rain forests after Amazon the entire landscape is composed of old growth forests over hundreds of years with over 600 species of trees. These forested landscapes, has received global attention as these can sequester carbon to a great extent. The huge forested landscape is home to Mammal's: 31 species, Birds 36 species, Reptiles 4 species, Amphibians 13 species, Fishes 84 species, Molluscs 43 species, Plants 95 species.

HCV3. The forested landscape contains several rare, threatened or endangered species,. which are threatened mainly due to land use activities such as mining, slash and burn agriculture, construction of logging roads, and commodity based urbanization. These developments has damaged the habitats of several endemics species such as Bonobo, Dyras monkey, Gorilla, Chimpanzee, okapi and various floras to threatened category.

HCV4. The Congo River, formerly Zaire River is the chief drainage system in REDD+ Project area. It raises in the Katanga plateaus and flows north and south in a great arc crossing the equator line. The river flow's southwest to join the Atlantic Ocean near Matadi and Banana. It is second longest and deepest river in the world. In Sankuru province, the chief rivers are Sankuru, Lomami, Lubefu and Lukenie. The chief rivers of Tshopo is Congo river, Lomami and Yambuya, The Tshuapa river is the chief hydro source of Tshuapa and in Equateur the major river is Congo and Lulonga (World Bank, 2017). The overall length of the Congo River is 4380 km thus making second longest river in the world. The Uele forms at the confluence of the Dungu and Kibali rivers which originates in the mountains near Lake Albert. These rivers join Mbomou River at Yokoma after travelling around 750 miles. The main tributaries to the Uele river are Bomokandi River and Uere River.

HCV5. Over hundreds of years local's depends on natural resources for their needs and sustainable livelihood aspirations. Historically, native populations of Africa have practiced shifting cultivation for thousands of years. The cultivation includes cassava, yams, cocoyam, banana and occasionally ground nuts. Traditionally, farmers cleared an area of forest, cultivate for 2 years and allow fallow period of 5-20 years depending upon soil conditions, land availability and other factors, and returned to clear and cultivate again.

HCV6. Traditionally, the people of this area are called as forest people. They are dependent on the forest resources for their survival, housing and food. These groups are managed by the

leaders often called as Chiefs". These are people practice various religious beliefs in the project area and its surroundings.

5.2.5 Species Used (B2.5)

Not applicable.

5.2.6 Invasive Species (B2.5)

Invasive species will not be used within the KMS REDD+ Project area.

5.2.7 Impacts of Non-native Species (B2.6)

The KMS REDD+ Project do not use any non-native species within the KMS REDD+ Project area.

5.2.8 GMO Exclusion (B2.7)

The KMS REDD+ Project do not use any Genetically Modified Organisms (GMO's) within the KMS REDD+ Project area.

5.2.9 Inputs Justification (B2.8)

The KMS REDD+ Project area do not use any fertilizers, chemical pesticides, biological control agents or any other materials/organisms which are harmful to the native wildlife and human welfare hence this section is not applicable.

5.2.10 Waste Products (B2.9)

The KMS REDD+ Project is designed not to produce any waste in planned activities. If any waste arises for any future reasons, we will adhere to the country regulations and guidelines.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

KMS REDD+ Project is designed to produce positive impacts therefore; there is no negative impacts on native biodiversity, community, or climate.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

The KMS REDD+ Project has hired radio station to educate communities the importance of natural resources including biodiversity. This information is disseminated in local language to offer protection to Biodiversity.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

Biodiversity Element	Monitor vegetation cover / land use patterns.
Estimated change	Maintenance and improvements of carbon stocks.
Justification of change	Periodic analysis of satellite imagery and GIS analysis.

Biodiversity Element	Monitor the areas of species such as Okapi, Chimpanzee and Bonobo that require maintaining populations. Habitat suitability modelling will be performed if applicable once in 5 years.
Estimated change	Monitor through patrolling in the species rich areas of the Okapi and record the sightings resulting in maintenance and improvement of Okapi numbers.
Justification of change	Increase in the number of populations/sightings in the Project areas. This is noted by sightings during regular patrolling..

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

A summary of the monitoring plan will be translated in relevant local languages like Lingala, Swahili, Tetela and French and disseminated to the community groups and other stakeholders prior to validation. Monitoring results will be communicated through meetings with the local Chiefs on an annual basis.

This Project is seeking Exceptional Biodiversity Benefits based on the presence of IUCN Red Listed Endangered species Okapia johnstoni Endangered (A2abcd+4abcd) in 2015.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

The KMS REDD+ Project intends to achieve the exceptional biodiversity benefits duing the life of the project.

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

The KMS REDD+ Project area is one of the most important countries in African continent for biodiversity and conservation. It has the highest number of species for almost all groups of organisms. The KMS REDD+ Project area also harbours a number of spectacular endemic species like the Okapi, Grauer's gorilla, bonobo and Congo peacock. The Okapi (Okapia johnstoni), also known as the forest giraffe, Congolese Giraffe, or Zebra Giraffe, is an artiodactyl mammal native and endemic Species to Democratic Republic of the Congo especially their home is KMS REDD+ Project area and also few other areas in other provinces . The Okapi inhabits canopy forests at altitudes of 500–1,500 m (1,600–4,900 ft). It occasionally uses seasonally inundated areas, but does not occur in gallery Forests, Swamp Forests, and habitats disturbed by human settlements. The principle threats to Okapi are housing and urban areas, Energy production & mining, logging, and Human intrusion & disturbance. The Okapi is hunted for meat and skin resulted in the declining of the population. Therefore, IUCN classified the okapi as Endangered (A2abcd+4abcd) in 2015. This is in turn qualifies KMS REDD+ Project to Gold level. Since the project is protecting Okapi.

Justification:

Okapi have been undergoing a decline in population since 1995 (at least) that is ongoing and projected to continue, in the face of severe, intensifying threats and lack of effective conservation action which is hindered by the lack of security. The rate of Okapi decline is estimated to have exceeded 50% (baseline scenario). The surveys in the Réserve de Faune à Okapis, RFO suggests that 43% of the population has declined between 1995 – 2007. The loss in the habitat to several agents such as Residential & commercial development, Agriculture & aquaculture, Annual & perennial non-timber crops, Oil & gas drilling, Hunting & trapping terrestrial animals, Logging & wood harvesting and War, civil unrest & military exercises has catalysed population decline. Therefore the species is confirmed to be Endangered under criterion A2abcd+4abcd.

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

The okapi is a Endangered species (A2abcd+4abcd, IUCN 2015), precious national treasure of DRC, featuring in popular culture and on countries banknotes, but it retains its paradox. Okapi underwent severe declination in population since 1995 due lack of protection. The rate of declination in population has exceeded 50% in last two decades. In 2013, Hart estimated that 35,000-50,000 individuals present in the entire country due multiple threats such as settlement expansion, agriculture land expansion, hunting for skin & meat, illegal-logging, War, civil unrest & military exercises. Despite several conservation efforts at various levels, both populations of

okapi and the network of protected areas and surrounding forests that they inhabit are threatened by the armed conflict and civil war that has been raging across much of their range over the past decade. The struggle for the conservation of okapi and other Congolese wildlife is accompanied by risks and sacrifices that have cost the lives of around 350 rangers during the course of their duties in the last decades alone. These threats are common to other species (WWF-DRC Division) as well therefore project choose Okapi as the main indicator of the sample of the biodiversity in this project.

Trigger Species	Okapia johnstoni
Population Trend at Start of Project	35,000 – 50,000 (Hart, 2013)
Without-Project Scenario	Okapia is very sensitive to human disturbance. It tends to avoid the human settlements. The principal threats to Okapi are habitat loss due to logging and human settlement including illegal occupation in protected areas resulting in the decline of mature individuals.
With-Project Scenario	According research or socio-economic survey's if the habitat loss is reduced by regular monitoring and educating communities to protect this endangered species this will increase population of the trigger species.

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Appendix #1 – List of meetings held with the local community and Chief's.

Period	Number of meetings held in all six provinces (simultaneously conducted in all the provinces)	Agenda for the meetings

1st October 2016 to 31st December 2016	436	Initiation of FPIC process. Meetings with the local communities and Chiefs to discuss the feasibility of implementing the REDD+ project. Identification and finalisation of REDD+ climate, community and biodiversity activities.