i. Project Name
Rimba Raya Biodiversity Reserve Project

ii. Project Location (country, sub-national jurisdiction(s))
Indonesia, Central Kalimantan, Seruyan Regency

iii. Project Proponent (organization and contact name with email address and phone number)
InfiniteEARTH - Todd Lemons
Email: contact@infinite-earth.com
Phone Number: +852-2682-6321
Web: www.infinite-earth.com

iv. Auditor (organization and contact name with email address and phone number)
ESI – Caitlin Sellers and Shaun McMahon
Email: csellers@ESINC.CC / smcmahon@ESINC.CC
Phone: +1-772-834-8571

v. Project Start Date, GHG Accounting Period and Lifetime
The Project Start Date is July 1st, 2009. The project crediting period (GHG accounting period) started on July 1st, 2009 and will end on June 30th, 2038. The Project has a lifetime of 30 years.

vi. The Project Implementation Period Covered by the PIR
The Project Implementation Period covered by this PIR started on July 1st, 2013 and ended on June 30th, 2014.

vii. History of CCB Status including Issuance Date(s) of Earlier Validation/Verification Statements etc.
CCB Validation: October 14th, 2011
CCB Verification (for period July 1st, 2010 to June 30th, 2013); 9th January 2014

viii. The Edition of the CCB Standards being used for this Verification
The Rimba Raya Biodiversity Reserve Project was validated under the CCB Standards Version 2. This Project verification will be completed under the CCB Standards Version 2.

ix. A Brief Summary of the Climate, Community and Biodiversity Benefits Generated by the Project
During the monitoring period covered by this PIR, the Project has achieved the following important climate, community and biodiversity benefits:

1. The project has avoided the conversion of a further 7000 hectares of peat swamp forest being converted to oil palm, bringing the total area of avoided conversion since the project commenced to 44,263 hectares.

2. Communities on the northern boundary have agreed to participate in planting activities to rehabilitate the recently disturbed area by the agent of deforestation. One small area in the northern area was planted in 2013 and an additional 60+/- ha was planted in 2014 for the Ulak Batu village. An additional 150 +/- ha was planted in the Central Unit for Muara Dua village.

3. With encouragement/support from the Project, seedlings for plantings within the concession boundaries are being sourced and purchased from village nurseries that are supported by individuals and families who provide the labour to grow the seedlings.

4. The demarcation of the ecosystem restoration concession (ERC) boundary has been completed and submitted to the Government for the final stage of the ERC licence. This will be the first of its kind in Indonesia.

5. A health assessment was undertaken by Alam Sehat Lestari in September 2013. This report identified major health issues, root causes of those issues and suggest a plan forward.

6. Farmers Field Schools have been held in 6 villages and both Ulak Batu and Muara Dua have established multi-species nurseries for the agro-forestry program in 2014.

7. A new Orangutan release center location has been identified.

8. The project has focused on utilising local communities for services, such as hiring speed boats and providing logistical support in the field.

9. A large Project employment plan has been initiated with 23 of a proposed 33 permanent field staff from the villages having been hired.

10. Two community centers have been built using Community Development Stimulus Funds in Ulak Batu and Palingkau.

x. which optional Gold Level criteria are being used and a brief summary of the exceptional benefits generated by the project to meet the requirements of each relevant Gold Level

Climate Change Adaption Benefits

Four areas of risk due to climate change were identified in the CCB PD. These are:

1. **Food security:** In the absence of project activities, drought and fire would be expected to reduce food security. Agricultural productivity would be expected to decline as a direct result of drought induced water shortage and soil nutrient loss from fire, as well as crop loss due to flooding. Planned activities to mitigate this risk are:
    a. Fire suppression, education and training
    b. Reforestation/Agro- Forestry- Afforestation
    c. Soil enrichment with Biochar
    d. Crop diversification, harvest rotation and application of new technologies for improved production
    e. Protect and manage large patches of contiguous forest
2. **Income:** Communities in the project management zone historically have had limited means of earning cash income with primary dependence on fishing, farming and collecting timber and non-timber resources from local forests This natural resource based economy is especially vulnerable to climate change including the cascading effects from drought and fire that lead to reduced agricultural and fish harvests. Additionally, fire-driven forest loss and damage directly reduce forest-sourced products, further reducing cash income. Planned activities to mitigate this risk are:
    a. Fire suppression, education and training
    b. Reforestation/Agro- Forestry- Afforestation
    c. Crop diversification, harvest rotation and application of new technologies for improved production
    d. Aquaponics
    e. Soil enrichment with Biochar
    f. Protect and manage large patches of contiguous forest
3. **Health:** Climate change and associated drought and fire would be expected to have a negative impact on water quality and health in the absence of the project. Peatlands act as water catchment and buffering systems providing water storage and protecting against flooding. Ecosystem damage would negatively impact this ecosystem function. Communities are dependent on the Seruyan River for all their water needs and project activities include improving access to clean drinking water, which is not readily available in Seruyan villages. Drought and flooding, predicted with climate change would be expected to constrain clean water access and increase the prevalence of water- borne disease in the absence of the project. Increased water temperatures associated with climate change would also be expected to increase the prevalence and toxicity of cholera outbreaks. Planned activities to mitigate this risk are:

   a. Water conservation, improved irrigation techniques
   b. Community education and build clinics to provide better access to healthcare
4. **Biodiversity:** Climate change, drought and fire would be expected to have independent and compounding negative impacts on biodiversity in the absence of the project. Fire and drought will impact tree mortality, contributing to species extirpation and habitat fragmentation, as well as changing in pattern of fruiting. Shift in fruiting patters may disrupt or change synchronous fruiting unique to Bornean ecosystems with negative consequences on the Project Areas biodiversity. Planned activities to mitigate this risk are:
   a. Fire suppression, education and training
   b. Reforestation/Agro- Forestry- Afforestation
   c. Protect and manage large patches of contiguous forest

Exceptional Community Benefits
The project generates the following exceptional community benefits:

- Prevention of further oil palm expansion resulting in maintaining and enhancing remaining forests in the Project Zone;
- Rehabilitation of selected riparian forest zones;
- Prevention of the spread of forest fires, specially into peat areas with direct impact on water quality of the Seruyan
- Reduce possible deliberate use of fire for renewal of shallow water fishing grounds through education and awareness campaigns
- Planned efforts to explore potential for facilitating communities to organize and establish a fisheries cooperative,
- Education and outreach to create viable safer alternative for public sanitation;
- Prevention of forest loss by oil palm expansion and possible development of local bodies to manage communal forest areas in a more structured fashion to promote chances for long term sustainability of forest areas.

Exceptional Biodiversity Benefits
A total of 54 species listed as Critically Endangered or Endangered by IUCN are likely present in the Rimba Raya Project Area, 17 of which are confirmed present in TPNP. An additional 40 species listed as Vulnerable by IUCN are likely present in the Project Area, 13 of which are confirmed in TNTP. Conservation of the Project Area has protected these species. Further surveys will be undertaken for the next verification stage to seek confirmation of some of these species.

xi. date of completion of this version of the PIR, and version number as appropriate
This joint Monitoring Report and Project Implementation Report (PIR) was completed on August 24th 2015 and is version number 1.6.

RIMBA RAYA BIODIVERSITY RESERVE PROJECT - MONITORING AND IMPLEMENTATION REPORT

(1 JULY 2013 – 30 JUNE 2014)

Document Prepared By InfiniteEARTH Limited

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Prepared By	InfiniteEARTH Limited
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1 GENERAL

1.1 Summary Description of the Project (G3)

The Rimba Raya Biodiversity Reserve Project, an initiative of InfiniteEARTH, aims to reduce Indonesia's emissions by preserving tropical peat swamp forest, avoiding deforestation, drainage and conversion to oil palm. Bordering the eastern boundary of the Tanjung Puting National Park in the Seruyan River watershed, Rimba Raya is rich in biodiversity including the endangered Bornean orangutan. Under the baseline scenario, the project area was slated by the Provincial government to be converted into four palm oil estates. These planned estates now comprise the 47,237 hectare Rimba Raya Carbon Accounting Area, which is monitored for the life of the project to protect and account for Rimba Raya carbon stores. The project monitors and reports on the Project Carbon Accounting Area, a 3km buffer zone surrounding the Project Carbon Accounting Area (collectively known as the Total Project Management Zone) and an extensive leakage belt. These monitored areas are fixed throughout the entire crediting period. A project profile is outlines in Table 1.

Table 1: Project Profile Highlights

Project Owner	PT Rimba Raya Conservation
Project Developer	Infinite-Earth Limited
NGO Partner & Project Beneficiary	Orangutan Foundation International
Host Country	Indonesia
Region	Kalimantan (Island of Borneo)
Province	Central Kalimantan
Regency	Seruyan
Forest Type	HCV Tropical Peat Swamp Forest
Total Project Management Zone	64,977 ha
Total Area at Risk of Deforestation	64,977 ha
Project Area (Carbon Accounting Area)	47,237 ha
Crediting Period Start Date	July 2009
Primary Deforestation Driver	Planned Deforestation (Palm Oil supported by government policy)
REDD Standards	VCS & CCBA
Methodology	"VM0004 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, v1.0"

The Rimba Raya project's **climate objectives** are:

1. to stop encroachment by palm oil plantations in the Project Area itself, thereby avoiding over 130 million tonnes of carbon dioxide-equivalent emissions over the life of the project;

2. to create a physical barrier between the palm oil plantations and Tanjung Puting National Park to protect the hydrological integrity of the National Park and avoid emissions from drained peat swamp forest.

The Rimba Raya project's **biodiversity objectives** are:

1. to expand the contiguous habitat of the national park eastward all the way to the Seruyan River, a natural and defensible boundary;

2. to support the work that OFI and Dr. Biruté Galdikas have carried out for decades, with a number of project activities aimed at extending OFI's conservation, rehabilitation, and environmental education programs.

The Rimba Raya project's **community objectives** are:

1. to actively engaging the communities within the project zone, building on the work of World Education to improve access to health care, education, and other government services;

2. to work with households to ensure food security and provide access to employment and capacity-building opportunities.

1.2 Project Location (G1 & G3)

Rimba Raya is located in the Seruyan Regency, in the province of Central Kalimantan, Indonesia. The Project lies between 112°01'12 "- 112°28'12" east longitude and 02°31'48"- 03°21'00" south latitude and is bounded by Tanjung Puting National Park in the west, the Java Sea in the south, the Seruyan River in the east, and a palm oil concession in the north (Figure1).

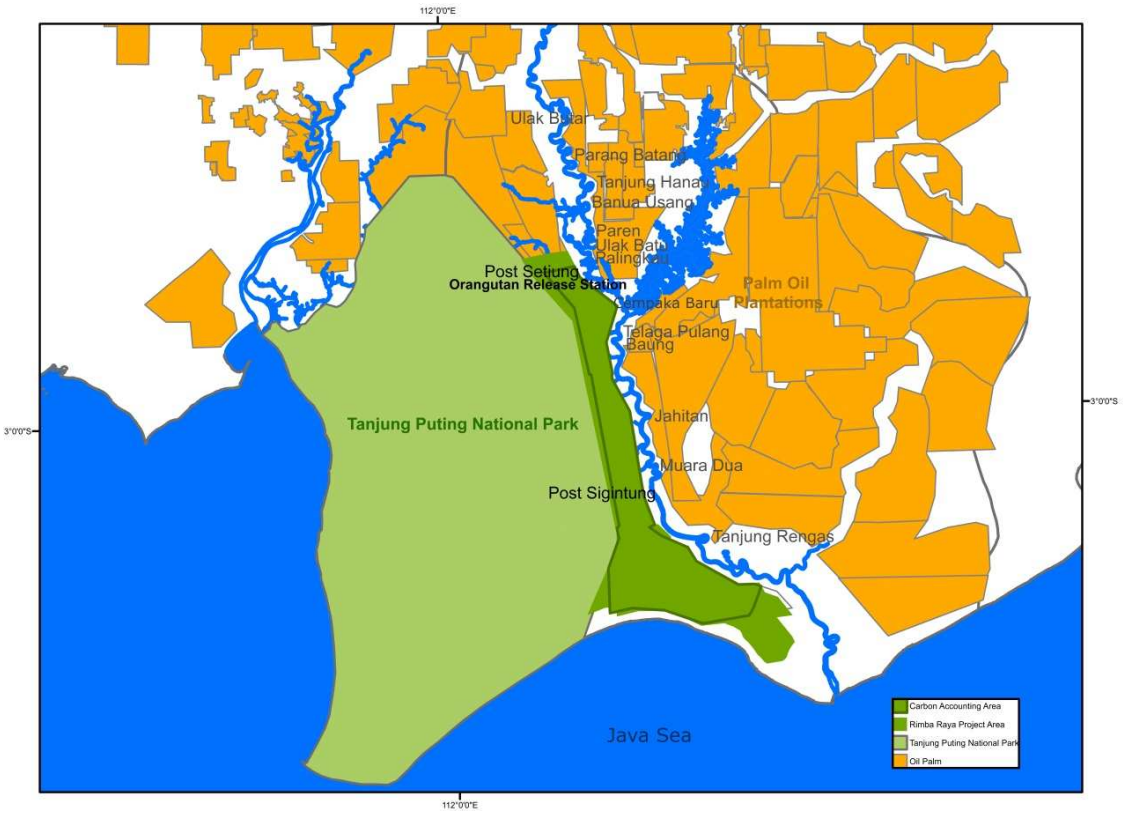

Figure 1: Project Location

1.2.1 Hydrology

The majority of the Project Management Zone falls within the Seruyan watershed, which flows along the eastern side of the Carbon Accounting Area to the south The Seruyan watershed itself covers approximately 13,144 km^2. Other watersheds in or near the Project Management Zone are small and near the coastline, with headwaters less than 10 km from the sea.

1.2.2 Geology

Surface geology of the Project Management Zone is dominated by depositional substrates of very recent origin compared too much of Kalimantan. Major elements are shown in Table 2.

Table 2: Geological Classes of Project Area

Geology Classes	Basic Description
Qad	Coarse to fine-grained sands, silts and mud
Qua	Unbedded coarse- to fine-grained sands, silt, clay , mud and peat
Qas	Cobble/pebble, sand, silt, clay and mud containing debris of terrestrial organic matter
Qs	Peats, kaolinitic clay, silt with intercalation of sand and plant remains
QTp	Carbonaceous sandstone, conglomerate, siltstone, claystone and peat
TQd	Conglomerate, sandstone and alternation of claystone-containing lignite layer with aralic environment, thickness up to approximately 500m, no fossil.

1.2.3 Soil

Co-dominant soil types derived from peat (SMU 3) and riverine alluvium (SMU 20) underlay the Project Management Zone. Coarser-textured sediment-derived soils are also found in the north (SMU 52); possibly associated with kerangas vegetation on poorly draining sediments with sub-surface hardpan).. A summary of soil types can be found in Table 3 below.

Table 3: Soil Types associated with each Soil Mapping Unit

Soil Mapping Unit	Dominant Soils	General Description	Parent Material	Sub-Landform	Relief
3	Haplohemist, Sulfihemists	Moderately decomposed peat soils some of which are sulphic	Organic	Peat Dome	Flat
14	Endoaquepts, Sulfaquents	Saturated Inceptisols and Saturated Sulphic Entisols	Aluvium	Delta or Esturary	Flat
20	Endoaquepts, Dystrudepts	Saturated Inceptisols and Acidic Inceptisols	Aluvium	Aluvial Flood Plane	Flat
52	Quartzipsaments, Durorthods	Quartizic Entisols and Spodosols with a Cemented Hardpan	Sediment	Terraces	Flat-Rolling
61	Haplorthods, Palehumults	Freedraining Spodosols and Humus rich Ultisols	Sediment	Terraces	Flat-Rolling

1.2.4 Climate

Rainfall in the Project Management Zone is approximately 2500 – 2700 mm per year (WorldClim v1.4 http://www.worldclim.org/). The Project Management Zone falls into two agro-climatic zones: B1 and C1.
Zone B1 has long-term averages of 7 – 9 months per year > 200 mm of precipitation per month and < 2 months per year with < 100 mm per month. C1 has 5 – 6 months at > 200 mm of precipitation per month and < 2 months of < 100 mm per month (Oldeman et al. 1980).

1.3 Project Proponent (G4)

InfiniteEARTH is the principal project proponent, responsible for the design and implementation of the project via its local operational entity, PT. Rimba Raya Conservation. A number of other institutions are involved in implementing specific programs or components of the project. The primary responsibilities and skill sets and the organizational structure are elaborated in Table 4 and Table 5.

Table 4. Roles and Responsibilities of Project Proponent

Entity	Description	Function
InfiniteEARTH 36/F, Tower Two, Times Square, 1 Matheson Street, Causeway Bay, Hong Kong Contact: Todd Lemons Email: contact@infinite-earth.com Web:www.infinite-earth.com	Infinite-Earth is dedicated to the development of economically viable solutions to climate change and environmental degradation by addressing the underlying drivers of deforestation - poverty. The company's projects are internally mandated to go "Beyond Carbon and Beyond Sustainability". To that end, Infinite-Earth projects focus on the preservation of Endangered Species Habitat, High Conservation Value Forests, and the protection of National Parks through the creation of social and physical buffer zones. Additionally, projects are designed to meet the UN Millennium Development Goals by funding sustainable development in rural communities through capacity building and technology transfer of low impact technologies such as solar, fuel efficient cook stoves, aquaponics, agro-forestry "jungle crops", and social benefits programs such as health care, early childhood education materials and tools such as "One Laptop per Child". The company was founded and is staffed by a group of seasoned professionals from broad multi-disciplinary backgrounds including: International Project Development, Sustainable Forestry, Conservation, Tropical Forest Ecology, Remote Sensing, GIS, Carbon Science, Finance and Marketing.	Forest Protection, Carbon Monitoring, Project Management, Community-based Enterprise Development, Carbon Sales

1.4 Other Entities Involved in the Project (G4)

All entities involved in the Project are listed in Table 5.

Table 5. Roles and Responsibilities of Associates

Entity	Description	Function
PT Pandu Maha Wana Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia	**PT Pandu Maha Wana dba Asia Pacific Consulting Solutions** is a forestry and agriculture consulting firm that provides support throughout Indonesia and Southeast Asia to those desiring and committed to changing their management of natural resources. Founded in 2010 by Loy Jones and Bertha Napitupulu, APCS are experts in their fields with more than a combined 50 years of experience in forestry, agriculture, fire control, surface mining, land use planning, natural resource management, sustainability certification and verification and business management. Their core specialty is providing agriculture, forestry and natural resources management consulting services. APCS is responsible for the staffing, supervision and implementation of all programs for the Rimba Raya project in Central Kalimantan.	Field Staff, Measuring and Monitoring, Forest Protection, Community Development, Ecosystem Restoration
Orangutan Foundation International (OFI) Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111 Indonesia Contact: Dr. Biruté Galdikas Tel: +62 0532-24778	**Orangutan Foundation International** is a nonprofit organization dedicated to the conservation of wild orangutans and their rainforest habitat in Indonesia and Malaysia. Founded in 1986 by scientist and conservationist Dr. Biruté Mary Galdikas and her former doctoral student, Dr. Gary Shapiro, OFI focuses on three objectives: research, conservation, and education. OFI also disseminates information about the orangutan to galvanize policymakers and the public toward an appreciation of orangutans and their highly endangered status. For more than three decades Dr. Biruté Mary Galdikas has studied and worked closely with the orangutans of Indonesian Borneo in their natural habitat, and is today the world's foremost authority on the orangutan. OFI will continue to provide a long-term local presence to the efforts of the Rimba Raya project and their function will be to continue to do what they have done for 40 years – protect orangutan habitat.	Forest Protection, Ground Surveying
World Education (WE) World Education Jalan Tebet Dalam IV-D Number 5A Jakarta 12810 Indonesia	World Education is an international NGO established in 1951 to meet the needs of the educationally disadvantaged, World Education has worked in over 50 countries in Asia, Africa, and Latin America, as well as in the United States. Working in concert with private, public, and nongovernmental organizations, World Education initiatives support effective local management and	Community Development and Education

Entity	Description	Function
	promote partnerships between local organizations. WE use experiential and engaging teaching techniques to help people and organizations develop skills that build on the learners' context (cultural, linguistic, geographic, and economic), and include vital information about life and livelihoods—health, agriculture, small business development—that learners can put to immediate use.	
Environmental Accounting Services (EAS) 3 Sim Jue Court, Sinnamon Park, 4073, Australia Contact: Dr Carly Green Email: info@enviroaccounts.com Web: www.enviroaccounts.com	**EAS** is a consulting company specializing in providing technical support services in forestry and agriculture carbon project development, monitoring, reporting and verification. The EAS team was engaged in 2013/2014 to provide guidance in remote sensing and ground measurements and the development of the monitoring and implementation report to meet the validated monitoring plan requirements.	VCS/CCB verification support services
Remote Sensing Solutions (RSS) Isarstr. 3 82065 Baierbrunn, Munich Contact: Peter Navratil Web: www.rssgmbh.de	**RSS** Remote Sensing Solutions GmbH is one of the leading value-adding companies in Germany for earth observation. The group specializes in • satellite image processing and interpretation • aerial image interpretation and photogrammetry • application development for geo-information system (GIS) • digital cartography RSS have conducted a number of land classifications in peatland areas Asia Pacific including Indonesia. The team was engaged in 2013 to improve the techniques for land use change classification.	Remote Sensing, Land Use Change Analysis

1.5 Project Start Date (G3)

As defined in the approved project documentation[1], the Rimba Raya project start date is November, 2008 and the crediting period start date is 1 July 2009.

1.6 Project Crediting Period (G3)

This monitoring report presents the results of the third monitoring period (M3) commencing 1 July, 2013 and ending 30 June, 2014. The total number of years covered by this monitoring report is one (1).

The first project operational year was July, 2009-2010. This year was verified against the Verified Carbon Standard (VCS) only. The second monitoring period (1 July, 2010 – 30 June, 2013) was verified against both the VCS and the CCB. This third monitoring period is consistent with the intended annual reporting cycle outlined in the Project Design Document.

[1] Available from the Verified Carbon Standard Project Database https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=674&lat=-2.78051067417254&lon=112.170133504944&bp=1

2 IMPLEMENTATION OF DESIGN

In May 2013, the Project achieved validation and its first verification for the period 1 July, 2009 – 30 June, 2010. The Projects second verification was completed on the on the 9 December, 2013. The third monitoring period covered by this report (i.e. 1 July 2013 - 30 June 2014). During this monitoring period the main objectives were to develop and begin to implement a strategy for getting field staff and operations in place since there was significant catch-up to do with very limited field staff. Negotiations had begun with Asia Pacific Consulting Solutions (APCS) in March 2014 to serve as a consultant in helping achieve this and during May and June those negotiations increased significantly with APCS asked to take full responsibility for field operations under the guidance of InfiniteEARTH and PT Rimba Raya Conservation office in Jakarta. The contract was agreed to and signed with the new arrangement becoming effective 1 July 2014.

While most of the activity has occurred after the period this monitoring report covers, much has been done, both from the standpoint of ensuring sufficient staffing to accomplish the stated objectives of the Projects Design Documents. From an operational perspective, the main field headquarters office was moved from Pangkalan Bun to Sampit to reduce travel time to and from the various parts of the concession. A Concession Manager, Biodiversity Coordinator, Local Government Coordinator and field GIS Coordinator were hired and put into place. The concession was geographically divided into three management units, North, Central and South and a field unit manager was hired and assigned to each. Within each field unit, field crews from the local villages within our project were hired consisting of 11 permanent personnel in Central Unit and six in both the North and South Unit that will be increased to 11 in January 2015. Additionally, the field staff increased coordination with World Education who was working to implement the community development program in the field.

From a program implementation perspective, work was commenced on surveying and establishing the permanent boundaries for the concession, installing subsidence poles to measure and monitor the impact of the encroachment in the North Unit, conducting routine patrols for monitoring forest protection from both fire and illegal encroachment, establishing nurseries in two villages for the tree planting program, starting the preliminary biodiversity survey and 1% vegetation inventory as required by the Ministry of Forestry, establishing better relations with the villages and local government, and other such routine tasks of managing a large concession.

2.1 Sectoral Scope and Project Type

The Rimba Raya project follows the framework of Reducing Emissions from Deforestation and Degradation (REDD) through Avoided Planned Deforestation (APD). This project is not a grouped project.

2.2 Description of the Project Activity (G3)

The primary Project Activity is to avoid the conversion of tropical peat swamp forest to oil palm plantations. Operationally this primary activity is achieved through the implementation of the following nine core Project Activities.

1. ***Establishment of the Rimba Raya Reserve***. The primary project activity has been the establishment of the Rimba Raya Reserve, a privately-funded protected area along the eastern boundary of Tanjung Puting National Park (TPNP). The management plan envisions the creation of a series of guard towers, a fire response plan and fire brigade, and a comprehensive monitoring system. These measures will help ensure the permanence of Project Area carbon stocks and biodiversity and the territorial integrity of TPNP. In addition, project proponents will fund significant enrichment and rehabilitation work inside the Project Area and its buffer zone, increasing carbon stocks and biodiversity.

2. ***Guard post network*.** OFI has been instrumental in funding and building a small network of guard posts along the perimeter of TPNP over the past two decades, with the bulk of these posts located along the park boundaries to the north and west of the Project Area. The Rimba Raya project will extend this network of guard posts to create comprehensive observation and communication coverage. The network of guards and guard posts will provide protection from illegal logging, poaching, and encroachment by oil palm plantations.

   Rimba Raya has hired local guards in the form of permanent field crews that are responsible for patrolling relating to forest protection and this has been done regularly since September 2014. Prior to establishing the network of guard posts, the permanent boundary of the concession must be surveyed and established on the ground which is in process. All field survey work was completed as of November 2014 and only the requirements of approval by local government officials and formal signing by the Ministry of Forestry remaining to finalize the process. Once that has been completed, Rimba Raya field staff will work with local government, TPNP staff and the local villages to identify the locations for the guard posts and begin construction in 2015.

3. ***Fire Plan*.** Fires have periodically swept through the Project Area and the park during dry periods. The Rimba Raya project will create a fire response system, including training and equipping a fire brigade and developing a fire response plan for the reserve in conjunction with guard towers and stations. To reduce the impact of fire, fire towers, fire brigade and equipment suitable for peat swamp firefighting will be established in the Project Area.

   The beginning of the Fire Brigades has been established with the hiring of a full 11 person permanent crew in Muara Dua (Central Unit where most remote fire activity occurs) and part of the full crews in the North and South units (6 people) where there is fire activity but better access. These crews were hired toward the end of the fire season so while able to take some action on smaller fires, were not able to be adequately trained and equipped to become the initial attack response that is envisioned for 2015 fire season. By that time we will have full crews in all 3 field units, will have provided them basic firefighting and safety training, equip them with appropriate pump kits (pumps, hose, nozzles, hand tools), and hopefully have one fully equipped initial attack fire speed boat located in Central Unit out of Muara Dua. During the roughly 6 month fire season, these permanent crews will be supplemented with 3 full (11 person) seasonal crews that will assist in conducting the routine field work, monitoring and measuring, building of guard posts and fire towers and other such tasks so the permanent crews can focus almost exclusively on fire prevention and suppression.

4. ***Monitoring Plan.*** A Monitoring Plan has been developed to collect relevant climate, community, and biodiversity data. Combining early warning, ground truthing and remote sensing, the monitoring plan will track key indicators to report on the integrity of the reserve's carbon stocks and biodiversity and to allow project proponents to adapt the reserve management plan to changing conditions.

   Crews have been established in all 3 field units to conduct patrols necessary to provide this early warning system and allow the field staff to take earlier action to conditions that warrant such. For example this system allowed the field staff to identify and stop illegal logging in the South Unit that was removing commercial trees from remaining natural stands. We also were able to identify plans by the local district government to construct roads to villages within our concession boundary and effectively work to get that project altered so the road locations were changed to remain outside the concession. District government agricultural projects (banana plantations) were identified as being planned for the South Unit buffer area that included construction of canals and we are now working with government to either relocate those projects or to find alternatives to the original plan that would have less impact on the peat in those areas.

5. ***Enrichment and Rehabilitation.*** The project proponents have committed to undertaking significant enrichment and rehabilitation work inside the Project Area. Each year, the project proponents will carry out enrichment activity, planting seedlings of native dipterocarp and other appropriate tree species in areas with an insufficient inventory of young trees. In addition, significant rehabilitation of non-forested areas (including shrubland, grassland, and deforested areas), is planned. In particular the planting of native species such as jabon, binuang, and makaranga that thrive in exposed and degraded conditions. By the conclusion of the project, significant stretches of forest will have been restored to their natural state, increasing carbon stocks in the Project Area and providing additional habitat, thereby strengthening the physical buffer protecting TPNP.

   Roughly 350 hectares of encroachment and/or fire damaged area was planted this year with 160,000 seedlings of varying species provided by nurseries established in Ulak Batu (North Unit) and Muara Dua (Central Unit). Standard reforestation surveys will be conducted at 3 months, 6 months, 1 year, 3 years and 5 years to ensure the success of the reforestation effort and identify supplemental interplanting during those periods to replace mortality.

6. ***Indigenous Species, Cash Crop, Community-based Agro-forestry Program***. As part of its reforestation effort, Rimba Raya will launch a community-based, cash crop agro-forestry project based on multi-story/multi-crop plantations of native species cash crops, including fruit, nut, spice, and rubber trees and jelutung, inter-planted with rare species (such as ramin and meranti) in a matrix of secondary forest regrowth.

   Two nurseries have been established in villages within the concession area, one in Ulak Batu which now has a permanent nursery site with an irrigation system, and one in Muara Dua where a permanent site has yet to be identified and instead has the seedlings grown and maintained by individual families within their property. Rimba Raya is working with the local villagers to identify a broad mix of income and subsistence wood producing species that are grown in the nurseries until replanting and then

purchased from the villages. These trees are planted by the families in the villages with the assistance of Rimba Raya staff in individual plots so that each family can maintain them over time and reap the harvests of any products once they grow to the required age. These include species such as jelatung and rubber for sap, ramin, meranti and ulin for village construction, and various fruit trees that can be harvested for subsistence or sale to OFI for feeding orangutan or to the oil palm companies for fresh fruit for their staff.

In 2015 we will ramp up a more intensive agroforestry program focusing on short, medium and long-term cash products once we have assisted the villages with participatory mapping to identify traditional use rights and individual spatial planning within those area to ensure both the integrity of the project area (especially the carbon accounting area) and livelihood of the villages. This is likely to include more "niche" product areas such as essential oils and other non-timber forest products like gaharu (agarwood) which bring higher prices and are becoming more difficult to find.

7. ***Funding of OFI activities.*** A portion of the revenues from the sale of the project's carbon credits will be used to fund OFI's on-going activities; including new programs for reforestation of critical orangutan habitats and acquisition of viable habitat that does not currently meet REDD project requirements for additionality. In addition, project proponents will build new orang-utan release centers and feeding platforms at strategic locations inside the Project Area. Working with project proponents, OFI will use the release centers to reintroduce as many as 300 orangutan from their orangutan Care Center and Quarantine (OCCQ) Rehabilitation Center near Pangkalan Bun, back into the wild, utilizing the reserve as a staging ground for their migration into the park.

8. ***Co-management of Tanjung Puting National Park.*** The TPNP Authority has the responsibility to protect over 400,000 ha of national park. Its staffing levels do not correspond to the level of pressure by the agent of deforestation. The mere presence of the Rimba Raya project along the park's exposed eastern flank will significantly support the authority to maintain the boundary. The Rimba Raya Conservation Project is committed to developing a for-profit conservation model for underfunded national parks. Under this model the project proponent will work to strengthen the co-management agreement already in existence between TNPN and OFI. The project proponent will also support park personnel training, capacity-building opportunities, improved equipment for monitoring and communication, and the reserve's fire brigade.

   While Rimba Raya field staff have frequent contact with TPNP management staff in both Pangkalan Bun and Kuala Pembuang, this part of the project has yet to proceed beyond initial discussions about options and cooperation between the two parties with OFI on various biological surveys.

9. ***Development of Social Buffer*** An essential element of the Rimba Raya project is the engagement of all stakeholders in the Project Zone in order to create a social buffer to the park and Project Area, thereby alleviating many of the external pressures that drive deforestation. The project proponents have created a process framework designed to disseminate information about project development and implementation, support community participation in all aspects of the project, and offer opportunities for capacity-building. To create an effective social buffer, project proponents believe that

a comprehensive approach to socio-economic development must be undertaken with the objective of addressing the root causes of community-based deforestation – namely poverty, hunger, disease, lack of adequate shelter, and exclusion. To that end, a slate of programs has been developed based on data from an initial social survey in the Project Zone and with reference to the UN Millennium Development Goals for Indonesia.

10. ***Community Centers.*** Following the successful example of OFI with communities in the park's western region, project proponents will build community centers in strategically selected villages inside the Project Zone to act as a soft interface between the Project and the communities. The community centers will offer facilities for park and project staff as well as for community organizations, and they will supply news and radio communication facilities, libraries, and social and agricultural training programs. A stimulus fund was established to provide IDR 400,000,000 (USD $32,000) for each village within the project area based upon a developed and approved proposal submitted by the villages. Currently 6 of the 10 villages have submitted their proposals and all 6 have received the funds, of which 2 (Ulak Batu and Palingkau) chose to use those funds for village meeting centers.

11. ***Agriculture & Aquaculture Productivity.*** The Rimba Raya project will also extend World Education's ongoing programs for food security, access to government services, and capacity building within the project zone. By helping local households meet their food needs utilizing land already under cultivation and by educating them about their political rights, the Rimba Raya project will eliminate many of the incentives driving illegal logging and the unnecessary conversion of forest to agricultural land. Agriculture activities have occurred in 5 of the 10 villages so far ranging from Farmer Field Schools to teach better agricultural practices, planting plots in various vegetables to demonstration plots. Crops covered to date include peppers, eggplants, rice, and various other vegetables capable of being supported by the various soil types present in each village. Support for cattle have been provided to Tenjung Rengas and Muara Dua.

12. ***Community Multi-crop Agro-Forestry.*** In keeping with its commitments to reforesting degraded lands within the Rimba Raya Reserve, the project proponent intends to implement a community-based agro-forestry program for native cash-crop species.

    Two nurseries have been developed; a permanent site in Ulak Batu and individual garden sites in Muara Dua with a purpose to provide seedlings that Rimba Raya will purchase, be planted by the villages in individual family plots, harvested by the villagers with the commodities harvested to be used for subsistence, sold to Rimba Raya or other others. Multiple species have been used to provide wood for construction materials, fruit for consumption and sale, and sap producing trees such as rubber and jelutung for income production. Additional discussions are occurring with a major international company that provides spa products on developing a program for plants providing essential oils, building a refinery in one of the villages for processing and then this company purchasing from the villagers all available oils regardless of grade.

13. ***Clean Water Systems.*** Recent years have seen increased flooding in the Seruyan River watershed, and Project Zone communities have had trouble gaining access to clean water resources. Based on

community surveys intended to help project proponents prioritize social programs, the first phase of programs aimed at creating a social buffer will include Potters for Peace, an organization that trains local communities to make and sell inexpensive ceramic water filtration devices.

To date water filters have been distributed to 725 households in 5 of the 10 villages. Currently a monitoring and maintenance program for the filters is being developed and implemented by World Education. In addition it was found that 2 of the villages have built water systems with government support that could provide clean water to every household within the community if they were working properly. Rimba Raya has started discussions with local government about cooperating with that program to train the villagers in proper maintenance, assist in the cost of repairs when needed, and help the community develop a business plan for water distribution so that villagers are able to in time fully support the program.

14. **Fuel-Efficient Stoves.** The Rimba Raya project proponents intend to make available to all Project Zone communities the clean cook stoves. These inexpensive, well-designed stoves significantly reduce the amount of fuel wood required to cook and the amount of smoke generated during cooking. The project proponent plans to provide every family bordering the Project Area with a stove.

    Two types of fuel-efficient stoves have been piloted within this portion of the program, the first of which was not well-received by the villagers due to being “top loaded” for fuel and the second of which has received only limited acceptance. Most villagers express a desire for gas stoves, which local government has a program for distribution these to the villages that is not being implemented due to logistics. For this element of our program, Rimba Raya is discussing with local government how we can assist in the distribution so that it becomes a reality and working with a national gas supplier to set up a distribution facility in one of the central villages in order to ensure a supply of gas continues to be available instead of the very small amount that is provided with each stove within the local government program.

15. **Biochar Briquettes Production.** Traditionally, in most rural settings, people use biomass material to cook with and to heat their homes. The biomass material used is either raw or in the form of processed charcoal. This form of energy source, while being widely accessible, is inefficient, degrading to the environment and a health hazard. The production of biochar briquettes presents an additional opportunity for community based enterprise through sustainable use of local resources.

    No activity has been started on this program to date.

16. **Low Maintenance - Small Scale Solar Lighting.** The lack of electricity in the communities bordering the Project Area affects their lifestyle and the economy. Project proponents intend to supply each village household and community center with a solar lighting system.

    The only activity to date in this program has been to explore options and pricing for potential implementation. Additionally, Rimba Raya is exploring additional options using LED lighting for family homes that uses a 12 volt DC battery for power and can be recharged using micro hydro, solar cell, generator or even a motorbike. This program will be developed further in 2015.

17. **Micro-Credit.** Microcredit is the extension of very small loans to people who otherwise have not access to finance. These individuals lack collateral, steady employment, and a verifiable credit history and therefore cannot meet even the most minimal qualifications to gain access to traditional credit. Project proponents will partner with certain organizations to provide: 1) funding for all individuals in the Rimba Raya Project Zone; 2) budget support for field agents to work in the area; 3) supplementary budget support as needed and justified; and 4) support for training of field agents dedicated to the region.

    No activity has been started on this program to date.

18. **Sustainable Health Care**. The project proponent plans to develop a health care system designed specifically to meet the needs of Project Zone communities in collaboration with Health in Harmony (HIH), a Western Kalimantan-based health care program that integrates high quality, affordable health care with strategies to protect threatened forests. The project proponents health care program framework will comprise three steps: 1. Assess the health care needs of Project Zone communities; 2. Develop a system that best suits their unique needs; 3. Implement the program and 4.. Evaluate the program regularly to improve, adapt, and evolve as we learn more and needs change.

    No activity has been started on this program to date.

19. **Floating Clinic**. Project proponents will arrange for the construction, outfitting, and deployment of a floating medical clinic. In lieu of community clinics, a floating clinic was chosen for its mobility and the resulting ability to deliver medical services up and down the Seruyan River, effectively servicing all of the communities in the Project Zone.

    The only activity on this program so far has been initial discussions with the Indonesia medical profession about how we might staff such a floating clinic once the funding is available to build and put it into operation. One avenue being explored further is to team with medical schools within Indonesia that provide senior students that would serve in the clinic for specific periods of time as part of their internship at no or low cost to the program and no cost to the villagers.

20. **Capacity Building Programs**. There are a number of specific capacity building programs, researched by project proponents as potentially applicable to Project Zone community needs. However, the final programs will be designed in collaboration with the communities to ensure that they address current community concerns and prioritize community needs for capacity building. Indigenous. Possible programmes are Peoples Eco-Tourism, Knowledge Transference, Orangutan Release and Tracking, Outreach and Education.

    Capacity building relating to outreach and education has already begun in Telaga Pulang with Student Field Schools focusing on agriculture capacity building with a solid framework in match, biology and the social science arenas. Additionally, informal capacity building in writing formal proposals, agriculture and fisheries has also started in several of the villages. Once the boundary is formally approved by the national government, identification of village boundaries through a participatory

approach, development of a spatial plan for each village and joint management agreements between each village and Rimba Raya will be developed as the basis for identifying and developing more capacity building programs based on each individual villages needs and desires identified during that process.

2.3 Management of Risks to Project Benefits (G3)

The main identified risks to the Project benefits are from ongoing pressure from oil palm expansion in the northern boundary and from fires lit by bordering communities to clear land and expand agriculture.

Through the utilization of carbon funding, the Rimba Raya Biodiversity Reserve Project aims to expand and enhance the patrol and protective work being undertaken in the area since 1971 by OFI. This funding will increase the patrols to act as a deterrent and the physical presence through marking of boundaries and eventual installation of posts and fire towers to for efficiently monitor and respond to threats.

The project has and will continue to make the necessary investments in job creation and income generation activities for the local communities from the sale of credits in the voluntary market.

In addition funds are available for enterprise development to reduce the pressure on agriculture expansion with the ambition to maintain and enhance the climate, community and biodiversity benefit beyond the life of the project.

2.4 Measures to Maintain High Conservation Values (G3)

A preliminary analysis of HCVs in the Project Zone determined that 11 of the 13 HCV sub-values defined in the Toolkit for Indonesia are potentially present. Maintenance or enhancement of all these HCVs depend directly on the protection of remaining forest, retention of connectivity between remnant forests in the Project Zone with those of TPNP, potential rehabilitation of degraded riparian forest zones in the Project Area, and prevention of oil palm expansion to protect water quality and associated aquatic habitats of the Seruyan. Specific measures to achieve this are outlined in Section 2.2 of this report.

2.5 Project Financing (G3 & G4)

InfiniteEARTH Ltd ,the implementing organization, has had revenues since 2013 when a large purchase was delivered to Allianz. Since that time, and in addition to that purchase, additional sales of several million credits have further secured and strengthened the financial positon of the project. Both Rimba Raya Conservation and Infinite Earth have funds available for project operations and manage their respective budgets in a fiscally conservative manner to enable the project to continue implementing its various initiatives without financial pressures. VCU sales information is publically available on the VCS website.

2.6 Employment Opportunities and Worker Safety (G4)

Job announcement for the local villages were distributed one month before the hiring of our permanent field crews began and a series of interviews were conducted in the three villages where these crews will be located.

No women submitted applications which is assumed to be primarily due to cultural differences and the fact that much of the work of these crews is hard labor, specifically relating to firefighting which will be their primary focus during fire season. At this time we have hired 23 of the 33 permanent crew members and will hire the remaining 10 in January 2015. An additional 33 seasonal crew members will be hired beginning at the end of the rainy season to work for six months allowing the permanent crews to focus primarily on fire prevention and control during the dry season. In addition, our plan is to hire two community development staff from each village (a well-respected senior and well-respected junior) that will assist in implementing community development programs within their villages. Our goal will be to increase our gender participation during this phase of hiring since many of the women in the villages have greater long-term interest in how their communities develop and opportunities for their family.

Worker safety to date has been of an informal nature with basic discussions of safety when new employees were hired and prior to field activities that require specific focus on safety issues. Standard Operating Procedures are in the process of being developed along with a formalized safety training program for each position that at minimum will include first aid training for all employees and the use of Personal Protective Equipment (PPE). PPE have been provided for current staff and will continue to be provided and emphasized from the standpoint of safety in the field. First aid and medical kits have been purchased to carry into the field when conducting field operations and larger ones for each of our permanent field offices.

2.7 Stakeholders (G3)

A summary of this Monitoring Report has been prepared and copied for distribution in all of the villages within the Rimba Raya operational area as well as district and sub-district seats. Notices have been placed in all villages about the availability of these summaries and announcements included within local newspapers where Rimba Raya has a presence. World Education and Rimba Raya office locations will have copies of this summary to distribute to villagers on request, and efforts made by all staff when working with the villagers on other components of the programs to share the information that information is available, we desire feedback, either positive or negative, and how to submit that feedback.

Additionally, once the boundary is completely legal and signed by the Ministry of Forestry, a participatory mapping and spatial planning processes is enacted. This Monitoring Report and the resulting verification reports will be shared with the local communities to be considered during that process. The results of those efforts could lead to changes and/or modifications to the Project Implementation Plans and at minimum will lead to a more village focused plan on what each community needs and desires from the Rimba Raya programs.

3 LEGAL STATUS

3.1 Compliance with Laws, Statues, Property Rights and Other Regulatory Frameworks (G4 & G5)

The main body of Indonesian law governing the relations between workers and employers is UU No. 13/2003.

In addition, the following conventions of the International Labour Organisation have been ratified by Indonesia:

- C81 – Labour Inspection Convention, 1947
- C87 – Freedom of Association and Protection of the Right to Organise Convention, 1948
- C98 – Right to Organise and Collective Bargaining Convention, 1949
- C100 – Equal Remuneration Convention, 1951
- C102 – Social Security (Minimum Standards) Convention, 1952
- C105 – Abolition of Forced Labour Convention, 1957
- C111 – Discrimination (Employment and Occupation) Convention, 1958
- C138 – Minimum Age Convention, 1973
- C169 – Indigenous and Tribal Peoples Convention, 1989
- C182 – Worst Forms of Child Labour Convention, 1999

Project proponents have a strong commitment to inform all stakeholders of their rights with respect to the project. The Rimba Raya project will exceed all local labor requirements and will ensure that all workers are apprised of their rights.

Rimba Raya (and APCS separately as their field associate) have Company Regulations that are required by law for any Indonesia company, foreign or national that has more than 10 employees. These Company Regulations are de facto regulated “labour agreements” that are developed through a negotiation between management and employees and ultimately approved by the Manpower Agency who checks to ensure they meet all legal requirements. Due to bureaucracy of the Indonesia government, the last part of the process is the most difficult and time consuming, so to date both Rimba Raya and APCS Company Regulations have not been approved by Manpower despite having been submitted to them at minimum for one year. However, there have also not been any issues raised by Manpower about any portions of these that do not meet regulations.

Every employee signs an employment agreement and is provided a copy of these Company Regulations so they are aware of their rights, the policies of the company and can ask questions on any part they may have concerns with. Additionally, we have to provide periodic reports to Manpower relating to employee relations, numbers of employees and locations in which any issues relating to labour laws can be identified and corrected. Salaries are currently set at and will always exceed government mandated minimum wage for the areas we are working in.

3.2 Evidence of Right of Use (G5)

Rimba Raya' right of use to the Project Area is demonstrated in the 'working area map' presented in Figure 2.

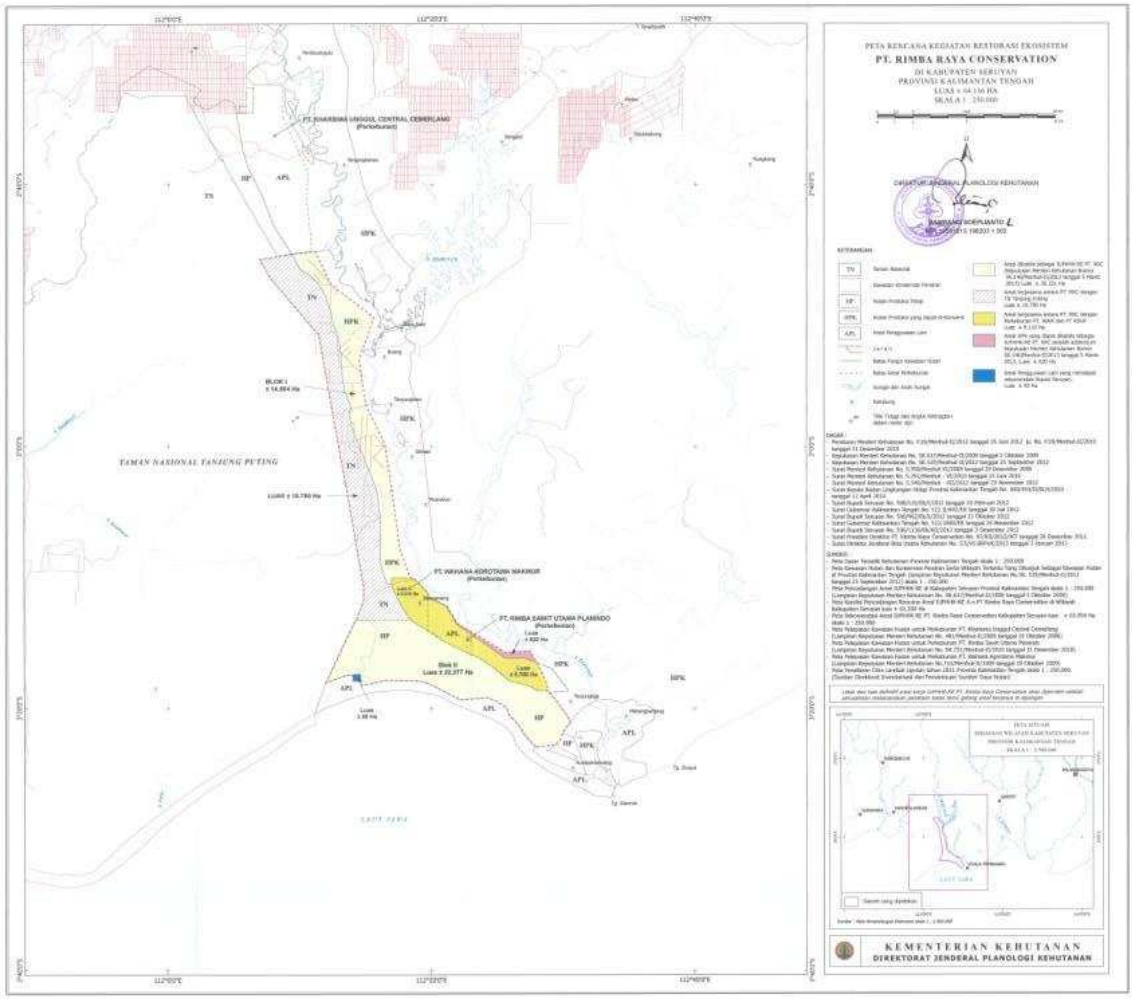

Figure 2: Official Working Area Map

The agreement types with the relevant stakeholders are presented in Table 6.

Table 6: User Rights Agreements as Presented in the Working Area Map

Name (on Map)	Area (ha)	Agreement Summary
Blok I (Green)	14,054	An official governmental decree for +/- 36,000 ha, which conveys land-use rights outright.
Blok II (Green)	22,277	
TPNP (hashed area)	18,780	An official governmental cooperation agreement with the National Park authority, which conveys rights and responsibilities to manage another +/- 18,000 ha on their behalf.
PT Wahana Agrotama Makmur	2,410	A commercial agreement from the palm oil company to manage another 8930 ha for conservation until such time as the government could revoke their license and reissue to us. Additionally, we have a letter from them to the Minister of Forestry asking him to do so.
PT Rimba Sawit Utama Planindo (included pink polygon to the north)	6,520	
APL (blue polygon)	95	This area is covered under the working map agreement and the land use will be converted to an ERC license to ensure this area can never be legally converted to oil palm.

3.3 Emissions Trading Programs and Other Binding Limits (CL1)

At the present time Indonesia has no binding limits on GHG emissions nor does it operate an internal emissions trading scheme.

3.4 Participation under Other GHG Programs (CL1)

The Rimba Raya Biodiversity Reserve Project is not registered with any other GHG program (aside for VCS and CCB which are covered by this verification), nor is it seeking registration with any.

3.5 Other Forms of Environmental Credit (CL1)

The Rimba Raya Biodiversity Reserve Project neither has, nor intends to generate any other form of GHG-related environmental or GHG emission reductions or removals claimed under the VCS program.

3.6 Projects Rejected by Other GHG Programs (CL1)

The Rimba Raya Biodiversity Reserve Project has never been rejected from any other GHG program, or any GHG program.

3.7 Respect for Rights and No Involuntary Relocation (G5)

The Project does not require people to relocate and maintains the local communities right to access the area for fishing and small scale removal of trees and collection of forest products. The project will never re-locate any people that could conceivable encroach on the project area lands, although we actively try to prevent this from occurring through patrols and education.

3.8 Illegal Activities and Project Benefits (G5)

The illegal activities that may be conducted from time to time in the project area include logging and deforestation and drainage by oil palm companies.

With the exception of the oil palm encroachment, Project partners OFI has a long and successful track record of monitoring the project area and deterring would be loggers and threats of fire such as hunters and shifting agriculture before they can do significant damage to the ecosystem, and dealing with the offenders using non-violent methods. The Project filed team is working with the same techniques and in many situations along-side OFI to continue this approach.

The Project does not benefit from illegal activity.

4 APPLICATION OF METHODOLOGY

4.1 Title and Reference of Methodology

VM0004 Version 1.0 Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests, Sectorial Scope 14.[2]

4.2 Deviations from the Monitoring Plan

The project has not deviated from any part of the methodology or monitoring plan during the monitoring period covered by this monitoring report.

4.3 Project Boundary (G1)

Table 7: Selected Carbon Pools

Carbon Pools	Selected (Yes/No)	Justification / Explanation of Choice
Aboveground Tree Biomass	Yes	Major carbon pool subject to the project activity
Belowground Biomass	No	It is assumed that belowground biomass is included in the peat component.
Dead wood	No	Conservative approach under applicability condition
Litter	No	Conservative approach under applicability condition.
Peat	Yes	Major carbon pool subject to the project activity
Soil organic carbon	No	The soil component is included in the peat component.
Wood Products	Yes	Removal of timber is associated with deforestation in the baseline, and significant quantities of carbon can be stored in long-term wood products rather than being emitted into the atmosphere. Thus the quantity of live biomass going into long-term timber products in the baseline scenario is included.

[2] Available from: Last Accessed: 26th May, 2013.

Table 8: Gaseous emissions from sources other than those resulting from changes in carbon pools

Source		Gas	Included/Excluded	Justification/Explanation
Baseline	Burning of aboveground biomass	CO_2	Excluded	However, carbon stock decreases due to burning are accounted as a carbon stock change
		CH_4	**Included**	Non-CO_2 gas emitted from biomass burning
		N_2O	**Included**	Non-CO_2 gas emitted from biomass burning
	Peat oxidation from drainage	CO_2	**Included**	Main gas of this source
		CH_4	Excluded	Drainage has been shown to have a small effect on CH_4 emission budgets; the highest proportional CH_4 flux forms only <0.2% of the CO_2 emissions in drained peat soils.
		N_2O	Excluded	Potential emission is negligibly small.
	Burning of peat	CO_2	**Included**	Emissions are accounted using an emission factor.
		CH_4	**Included**	Non-CO_2 gas emitted from peat burning; emissions are accounted using an emission factor.
		N_2O	Excluded	N_2O is not typically a measured trace gas emission from peat burning; potential emission differential between natural and burned peat is negligible.
Project	Burning of aboveground biomass	CO_2	Excluded	However, carbon stock decreases due to burning are accounted as a carbon stock change.
		CH_4	**Included**	Non-CO_2 gas emitted from biomass burning.
		N_2O	**Included**	Non-CO_2 gas emitted from biomass burning.
	Peat oxidation from drainage	CO_2	**Included**	Main gas of this source.
		CH_4	Excluded	Drainage has been shown to have a small effect on CH_4 emission budgets; the highest proportional CH_4 flux forms only <0.2% of the CO_2 emissions in drained peat soils.
		N_2O	Excluded	Potential emission is negligibly small.
	Burning of peat	CO_2	**Included**	Emissions are accounted using an emission factor.
		CH_4	**Included**	Non-CO_2 gas emitted from peat burning; emissions are accounted using an emission factor.
		N_2O	Excluded	N_2O is not typically a measured trace gas emission from peat burning; potential emission differential between natural and burned peat is negligible.

4.4 Baseline Scenario (G2)

In 1996, the Tanjung Puting National Park border was set and comprised 396,000ha. Each province and district in Indonesia is required to conduct ten-year spatial plans and the 2003 plan for Central Kalimantan indicated a different, smaller border. This revision to the border of the Park was agreed to by the Minister of Forestry in 2005[3]. In the buffer area east of the park in what is now the Rimba Raya concession two timber concessions selectively logged the area during the 1980s and 1990s, PT Bina Samaktha[4] in the northeast portion and PT Mulung Basidi[5] in the southeast. The companies stopped operations in 1998 and 2000, respectively. Since then some of the easily accessed forest has been illegally selectively logged by nearby villagers. In 2004, five oil palm estates were formally proposed to the Bupati and the Governor that partially occupy the ex-timber concessions adjacent to the Park. By 2007, all five of these proposed estates had received the initial stage of oil palm permits from the Seruyan Bupati with the northernmost estate also being granted the estate license (HGU – Indonesian acronym). Following HGU designation, the northernmost estate was rapidly converted to oil palm plantation. This concession, managed by PT Kharisma Unngul Centratama) became operational in 2007.

4.4.1 Without-project' effects on communities within Project Zone

Oil palm development, if conducted in accordance with current laws, would see companies working in partnership with local communities to develop land with the expectation of strengthening the local economy and eventually improving the welfare of local communities. To date, however, the process of land acquisition by oil palm companies in the Project Zone has created conflict over land rights where none existed. Compensation for land has been decided unilaterally by oil palm companies, and communities complain that they have been treated unfairly. Companies often clear land and plant oil palm prior to receiving consent from the communities and signing a formal lease agreement. The current situation is unlikely to change without first reaching a peak of collective protests and/or violence on the part of the communities, with reprisals from plantation owners, as seen in other parts of Indonesia.

Beyond these conflicts over land rights and compensation, forest conversion by oil palm companies – the 'without project' scenario – will likely diminish the region's capacity to deliver environmental services on which Project Zone communities rely. The replacement of robust ecosystems with monoculture plantations like oil palm inevitably reduces water retention and increases runoff and flooding. Recent and persistent flooding in the Project Zone is attributable to the conversion of land for oil palm plantations to the north of the Project Area.

[3] Minister of Forestry's SK No.292/MENHUT-VII/2005 Tanggal 13 Mei 2005

[4] SK HPH No. 33/KPTS/Um/I/1978 tanggal 8 Januari 1978 seluas ± 50.000 Ha

[5] SK HPH No. 26/KPTS/Um/I/1980 tanggal 14 Januari 1980 seluas ± 98.000 Ha)

The pollution of rivers with chemicals used to fertilize the soil is another inevitable consequence of plantation development.

Oil palm development creates a local "Catch 22": Conversion leaves communities landless; in turn, community members obtain temporary work clearing land, planting, and harvesting oil palm, but after the initial push to develop a plantation, regular employment is usually unavailable. Community members then turn to fishing, but increased flooding and pollution diminish the Seruyan's capacity to support this livelihood. Project Zone communities have already experienced the negative environmental impacts of oil palm with only limited plantation development. Continued development is likely to increase the stress on these impoverished communities. Under such conditions, poverty levels are likely to rise further, provoking collective protests and demonstrations by the communities with possible violent repercussions, as has happened in other parts of Indonesia with similar patterns of oil palm development.

4.4.2 'Without Project' Scenario Effects on Project Zone Biodiversity

TPNP is world-renowned for its orangutan population. With a population of 5,000 individuals, representing 10% of the global orangutan population, the Park makes an essential contribution to the protection and continued survival of the Bornean orangutan. Rimba Raya is an important part of greater TPNP, and its large forest blocks adjacent to the park augment TPNP orangutan populations by an estimated 14%. Additionally, Rimba Raya's mosaic of terrestrial and aquatic ecosystems house hundreds of species of flora and fauna and provide habitat for many rare and endangered species. A recent study of the Project Management Zone documented high biodiversity including 361 species of birds, 122 species of mammals, and 180 species of trees and woody plants likely to be present in the Project Area.

Orangutan populations and most of Rimba Raya's biodiversity would be lost with conversion to palm oil, the most likely 'without-project' scenario. The park's northern border already consists of palm-oil plantations and there has been a history of encroachment and other negative impacts by plantations on the park. In December 2002 as much as 30,000 tonnes of palm-oil mill effluent leaked into the Sekonyer River after settling ponds at the Wana Sawit oil palm plantation ruptured. This damaged the aquatic ecosystem threatening endangered freshwater fish species and polluting the water resource on which local people depend. In May 2003, Wana Sawit planted oil palm on up to 380 hectares of once-forested land inside the park's border. In June 2004, a series of roads up to 10km long were discovered leading from this area further into the park, facilitating illegal logging and extensive degradation of the protected forests. In 2004 NGOs uncovered plans by three other plantation companies to expand their operations. Examination and satellite analysis of these plans revealed that over 17,000 hectares of park land, nearly all of the supposed 'buffer zone' along the Eastern border, would be lost if the proposed expansion took place.

Without the Rimba Raya project, this expansion of palm oil plantations encroaching the park would undoubtedly proceed according to plan. Under the most likely 'without project' scenario, severe negative impacts on biodiversity in the project zone can be expected. Under this scenario, all of the Project Area is

converted to oil palm. Such a large expansion of oil palm would lead to remaining forests being heavily exploited and very few, if any, natural forests remaining. As has been experienced in other areas in Kalimantan and Southeast Asia, this scenario would likely isolate patches of remaining forest, eliminating existing connectivity with the national park and between remnant patches of forest. Such a large-scale conversion to oil palm would leave very limited habitat for threatened species, and would lead to their local extinction. Only a small percentage of native wildlife can persist in such an environment, able to live in (e.g. mice, rats, pangolin), use, or pass through (e.g. pigs and deer) oil palm plantations. Seed banks of threatened plants would also be lost through such large-scale conversion to monoculture.

4.5 Additionality (G2)

The basis for “additionality” in the project area is “Avoiding Planned Deforestation” where government land-use planning policy specifically targets the project zone for conversion from a “forest” classification to a “non-forest classification for industrial agriculture exploitation” (principally oil palm).

Prior to the project commencement, the project management area has been proposed by the provincial government to be gazetted for conversion to non-forest agricultural industrial estates. In response, oil palm concessionaires applied for and were granted 5 concession areas, which comprise the entire project area (carbon accounting area) by the local regency and the Provincial government. Conversion to oil palm has significant climate impacts through a loss of forest cover and subsequent emissions from peat drainage. Conversion to oil palm results in a loss of habitat for a range of endangered species, leaving them with few places left in Indonesia to relocate. Oil palm conversion also threatens local community water quality and livelihoods. Whilst the oil palm industry contributes significantly to the economy it also removes the forest resource and changes community interaction with the landscape in particular access to fishing and small scale timber for boat building. The oil palm companies rarely contribute direct assistance or interact with the local communities to determine their health, education and livelihood needs.

The Rimba Raya Project through its relationship with World Education is committed to providing programs and access to micro financing that will lead to a measureable net impact in these communities that can be attributed to the Project.

5 MONITORING DATA AND PARAMETERS

5.1 Description of the Monitoring Plan (CL3, CM3 & B3)

A Monitoring Plan has been developed to collect relevant climate, community, and biodiversity data. Combining early warning, ground truthing and remote sensing, the monitoring plan tracks key indicators to report on the integrity of the reserve's carbon stocks, biodiversity and communities to allow project proponents to adapt the reserve management plan to changing conditions.

5.1.1 Purpose

The purpose of the Rimba Raya Biodiversity Reserve Project monitoring plan is to confirm that the estimates of ex-ante GHG removals presented in the VCS Project Document are being met, and to identify and account for any unplanned reductions in project carbon stocks, increase in project emissions or possible leakage outside the project boundary. Additionally, monitoring the project implementation activities enable Project Proponents to objectively assess biodiversity and community project components, to identify gaps and deficiencies and use this information to improve both monitoring and management of the Project.

5.1.2 Monitoring Organisational Structure, Responsibilities and Competencies

The monitoring plan is implemented by Rimba Raya staff in conjunction with Asia Pacific Consulting Solutions, Orangutan Foundation International, Environmental Accounting Services (EAS) and Remote Sensing Solutions (RSS). These organisations descriptions and Functions are listed in Section 1.3 of this report.

Operationally the monitoring of the Project Area is managed by Asia Pacific Consulting Solutions, with the day to day monitoring activities being performed by Rimba Raya field staff operating out of the companies Sampit office and with support from the Jakarta office.

5.1.3 Methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters.

A key feature of the Rimba Raya monitoring plan is to employ spatial data and tools to systematically monitor land cover change in the project area and project buffer. This is combined with ground-based surveys to investigate and record information on any activities that affect project carbon stocks and peat emissions (e.g. fire, logging). Such an approach improves the efficiency and effectiveness of directed field visits, which is essential for reliably monitoring the Rimba Raya project boundary in extensive and inaccessible peat swamplands.

This type of approach to field monitoring has been employed by project partner, Orangutan Foundation International, in the project area since 2004. Rimba Raya monitoring builds on the existing field reconnaissance, forest survey and G.I.S. team training, protocols and monitoring systems already in place for many years.

The monitoring is effectively divided into two components: 1. Proactive Patrols and 2. Reactive targeted ground surveys.

1. Proactive Patrols

Monitoring data is generated throughout the monitoring period from ground patrols carried out by the Rimba Raya staff based at the Sampit office and in the three field units. During these patrols, staff record any findings with GPS tagged photos and descriptions in reports that are generated on return to the office. All information is stored at the office and copies are provided to the Project Manager, Asia Pacific Consulting Solutions during regular progress reporting meetings.

2. Reactive targeted ground surveys

Following the annual assessment of land cover analysis from remote sensing data, areas may be identified for targeted ground surveys (i.e. burnt areas, or suspected leakage activities). GPS points of the areas to visit are provided by Environmental Accounting Services to the Rimba Raya field staff through Project Manager, Asia Pacific Consulting Solutions. The field crew then apply the relevant standard operating procedure to collect data and report back on the field findings back to The Project Manager. The data/photos and reports are stored both in the Sampit office and a copy provided to Asia Pacific Consulting Solutions to store off site.

The aggregation of data into the monitoring report is co-ordinated between EAS (climate components) and Asia Pacific Consulting Solutions (community and biodiversity components).

5.1.4 Monitoring Components

There are eight major components of monitoring: three that are focused on project conditions and forest protection (Table 9) and five that are focused on annual land change assessment for carbon accounting (Table 10).

Table 9. Monitoring Components: Project Conditions and Forest Protection

Monitoring Component	Activity and Years	Times and periods	Detection frequency	Remote sensing data source[1]	Field survey frequency	Reporting frequency
Boundary	Mark in field	Year-end	Non-specific	n/a	1 field survey annually	Annually
	Patrol Yr1-Yr30		Annually	Landsat 30m satellite imagery annually.		
Stratification	Land cover classification (Yr1 develop model, Yr2-3 refine model, Yr 4-30 apply standard model)	Year-end	Annually	Landsat 30m satellite imagery annually.	1 field survey annually	Annually
Forest Protection	Routine patrols and as-needed intervention (expanding coverage and intensity of intervention Yr-1 to Yr-3 in conjunction with community and stakeholder involvement)	Year-round	Quarterly	Landsat 30m satellite imagery annually.	1 patrol quarterly and as-needed	Quarterly

1.See Appendix 1 for list of Landsat sensors employed, coverage, acquisition date, and path row identifiers of the images used for current and previous monitoring periods

Table 10. Monitoring Components: Land Change Assessment for Carbon Accounting

Monitoring Component	Activity and Years	Times and periods	Detection frequency	Remote sensing data source[1]	Field survey frequency	Reporting frequency
Land change	Detection and area calculation of land change caused by agents other than logging or fire (e.g. mechanical clearing)	Year-round	Semi-annually	Landsat 30m for detection	2-3 field surveys annually	Annually
Logging	Detection and area calculation of deforestation caused by logging	Year-round with increased activity during wet season	Semi-annually	Landsat 30m for detection combined with field work	2-3 field surveys annually	Annually
	Detection and survey of transport canal-building associated with logging			Landsat 30m for detection combined with field work		
Fire	Detection of fire ignitions, calculation of burn areas (deforestation associated with fire)	Year-round with increased activity during dry season	Monthly, weekly, daily	MODIS imagery (1 km thermal band detects fires as small as 100m2 and imagery is collected and posted daily)	2-3 field surveys annually	Annually
Biomass plot surveys (not required)	Survey of above ground biomass originally conducted for the baseline carbon assessment	End of year	None	Linked to high resolution aerial imagery (1-5m)	1 field survey every five years	10-year baseline reports
Leakage	New permit activity	Year-round	Quarterly	n/a	n/a	Annually
	Spatial analysis of new palm oil in areas of possible leakage	End of year	Annually	Landsat 30m for palm oil boundary interpretation and delineation	none	Annually

1.See Appendix 1 for list of Landsat sensors employed, coverage, acquisition date, and path row identifiers of the images used for current and previous monitoring periods

Community monitoring components are summarised in Table 11 below. These components need to be reported bi-annually and will be undertaken by World Education.

Table 11: Community Monitoring Components

Monitoring Component		Activity and Years
Initial Community Monitoring Component	Physical	Number of households that have upgraded from leaf to aluminium roofs.
		Number of individuals with fishing boats or other fishing equipment.
	Financial	Income and expenditures of families (e.g., proportion of households with income higher than the current level of income).
		Employment rates (e.g., number of family members with a job or business; distribution of job opportunities across gender and social status).
	Social	Number of households with members involved in at least one community organization or program.
		Proportion of families who participate in the formal electoral process (Number of households with actual voters).
		Number of grievances recorded against oil palm companies declines.
		Level of adherence to laws and frequency of penalties being given for those breaking them.
	Natural	Assess any decrease in flooding of their agricultural land and/or an increase in productivity of arable land.
		Assess that forests and agricultural areas that are important to meeting basic needs have become available.
		Assess water quality for turbidity and pollution and that draining of peat swamps in the area has stopped.

Monitoring Component		Activity and Years
	Human	Check improvement in proportion of households or individuals with knowledge and information on hygiene
		Check number of incidence of diarrhea, typhoid
		Check proportion of households with sanitary toilet facilities (not excreting into the Seruyan River where they wash dishes and bathe)
		Check for improved sanitation facilities (hand washing soap, safe water containers, water treatment)
		Check percentage of households with access to clean water
		Check number of water treatment facilities in a village
		Check mortality rates (infant, child, mother)
		Existence of medical centers (including number of doctors and nurses and number of patient visits)
		Check prevalence of acute and chronic malnutrition and disease
		Check number of children attending school
		Check percent of family members who go/have gone to school
		Check number of family members who are able to read and write
		Check number of family members who have attended some type of livelihood related training

Monitoring Component		Activity and Years
Comprehensive Community Monitoring Component	Preliminary High Conservation Monitoring Plan	Mapping of HCV5(basic needs) and HCV6 (Cultural Identity) areas
	Community Needs assessment	In depth community needs assessment in each village prior to any on the ground project implementation in coordination with World Education. To identify gaps between community needs and desired conditions with regard to all five capital assets as shown above.
	LARASITA	Work together with the local BPN office (Badan Pertanahan Nasional) through its LARASITA Program to establish formal land ownership for communities. Check formal landowner ship has been established
	Illegal logging	Mapping of real actors of illegal logging
	Job Opportunities with the Rimba Raya Project	Develop a strategy to provide training and other educational programs with the goal of increasing local capacity to fill more skilled and permanent positions within the project organization. Check local capacity has increased within the project organization.

The approved CCB Monitoring Plan stated that the biodiversity indicators are to be monitored through an annual summary of activities. Biodiversity monitoring components are summarised in the Table 12 below.

Table 12. Biodiversity Monitoring Component

Monitoring Component		Activity and Years	Times and Periods	Detection frequency	Remote sensing data, resolution, coverage and years	Reporting frequency
Preliminary Biodiversity Monitoring Components	Forest Cover and Condition	Identification of change in forest cover classes with ecosystem-specific methods.	Every six months	six monthly	Medium- resolution imagery (e.g. Landsat 7)	Annually
		Identification of change in forest cover classes with ecosystem-specific methods	Annually	Annually	High-resolution imagery (Ikonos, QuickBird, or aerial photography)	Annually
		Ground patrol to check permanent 10- 20 km transects for tree loss	Continuously	Continuously	n/a	Annually
	Plant and Wildlife Populations	Survey of indicator species for plants, birds, mammals, and herpetofauna	Annually	n/a	n/a	Bi-annually
		Orangutan Survey	Continuously	n/a	n/a	Annually
	Quality and Condition of Aquatic and Wetland Ecosystems	Monitoring of water quality in the Seruyan River and Lake Sembuluh.	Ongoing	As required	n/a	As required
	Fire	<see above in Climate section>				

Monitoring Component		Activity and Years	Times and Periods	Detection frequency	Remote sensing data, resolution, coverage and years	Reporting frequency
Comprehensive Biodiversity Monitoring Component	Ecosystem mapping	Field survey to describe vegetation types based on structural attributes and diagnostic species assemblages.	Annually	Bi-annually	n/a	Bi-annually
		Develop draft vegetation map integrating these data with other secondary sources such as improved soil maps, geology, and land systems	Annually	Bi-annually	High resolution imagery used in climate component	Bi-annually
	Confirmation of Species Likely or Potentially Present	Undertake Botanical Survey, document possible population estimation of HCV 1.2 (Critically Endangered Species) and 1.3 (Areas that Contain Habitat for Viable Populations of Endangered, Restricted Range or Protected Species) species. One area of special consideration should be the survey of orchids and other rare epiphytic plants.	Annually	Bi-annually	n/a	Bi-annually
		Undertake Avifaunal surveys to confirm the presence of bird species considered likely or potentially present under HCV 1.2 and 1.3 and to begin developing a sense for areas rich in rare, threatened, or protected bird species. Bird surveys should be carried out in coordination with surveys for other taxa, in particular plants, and the selection of survey sites should be informed by refined vegetation maps.		Bi-annually	n/a	Bi-annually
		Undertake Mammal surveys, Orangutan survey could/should be separate project.		Bi-annually	n/a	Bi-annually

Monitoring Component		Activity and Years	Times and Periods	Detection frequency	Remote sensing data, resolution, coverage and years	Reporting frequency
		Undertake Herptofauna surveys. Focus on Painted river terrapin, the False Ghavial (Tomistoma schlegelii) and the Estuarine Crocodile (Crocodylus porosus).		Bi-annually	n/a	Bi-annually
	Bird Survey of Lake Sebuluh	Undertake Bird survey and confirm previously recorded species.	Annually	Bi -annually	n/a	Bi-annually
	HCV Full Assessment	Identify HCV 3 (Rare or Endangered Ecosystems) in the Project Zone using the Analytical Method described in the revised HCV Toolkit.	Annually	Bi - annually	n/a	Bi-annually
		Conduct follow- up assessment of HCVs 5 & 6, should be done as part of community assessment	Annually	Bi - annually	n/a	Bi-annually

5.1.5 Procedures for handling internal auditing and non-conformities.

All non-conformities found during internal auditing and external auditing are provided a ranking classification of major or minor with major non-conformities having priority. A timeframe is provided within which the non-conformity must be remedied and be ready for the next internal audit. The Concession Manager assigns someone on the field team the responsibility to ensure that the non-conformity is promptly dealt with and to supervise work on the ground. Once the field team determines the non-conformity has either been remedied or the timeframe for resolving the non-conformity expires, whichever comes first, a follow-up internal audit occurs to ensure there is now full compliance.

5.1.6 Description of monitoring and reporting frequency, and plans for publication and dissemination to the communities and other stakeholders

Field monitoring occurs within each field unit on a minimum of a weekly basis, and in some locations where there is concern for, or a history of encroachment, it can be as frequently as daily. Monitoring trip reports are kept at the field unit level for each trip and compiled by field unit manager as a summary to be provided to the Sampit office on a monthly basis. APCS uses these reports along with work progress reports to provide a monthly report to InfiniteEarth and RRC Jakarta office and to prepare the annual period monitoring plan. The reports are available by anyone upon request and actively disseminated to all stakeholders on an annual basis prior to any upcoming audit.

5.2 Data and Parameters Available at Validation (CL3)

Data Unit / Parameter:	CF
Data unit:	Dimensionless
Description:	Carbon fraction of dry matter
Source of data:	IPCC default value = 0.50
Value applied:	0.50
Purpose of the data:	Used in multiple carbon calculations to convert biomass to carbon as detailed in VM0004.
Any comment:	

Data Unit / Parameter:	$A_{B,\ it,logged}$
Data unit:	Ha
Description:	Area of land logged under the baseline scenario for stratum i, in time t
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	Rate 2,800 ha yr^{-1} (stratum i, time t)
Purpose of the data:	Used in Timber Extraction spreadsheet
Any comment:	The area logged was assumed to be the area cleared in all landcover types classified as forest. The expected annual rate of conversion was determined by analyzing historical rate of conversion by the baseline agent.

Data Unit / Parameter:	P
Data unit:	Dimensionless
Description:	Percent of harvest industrial roundwood going into long term wood products
Source of data:	Industry standard value: FAO 1995. FAO Yearbook: Forest products. FAO For. Serv. No. 28, FAO, Rome, 422 p.
Value applied:	0.25
Purpose of the data:	Used in Timber Extraction spreadsheet
Any comment:	In the project region, the proportion of harvested wood that goes into long-term wood products was obtained using FAO data for Indonesia cited in Winjum et al. (1998)

Data Unit / Parameter:	AP
Data unit:	m^2
Description:	Plot Area
Source of data:	Aerial plot measurement
Value applied:	10,000
Purpose of the data:	parameter created but not used
Any comment:	Equation 38 not used as the allometric method was not selected as allowed by the methodology (p. 20); Equation 32 not used because different AIM Step calculations were made.

Data Unit / Parameter:	Φ
Data unit:	g cm^3
Description:	Volume-weighted average wood density
Source of data:	Literature Value: Reyes, Brown, Chapman and Lugo (1992) mean wood density for tropical Asia represented by 428 species, SE = 0.007
Value applied:	0.57 (SD = 0.145)
Purpose of the data:	Used in Biomass Burning Spreadsheet
Any comment:	Equation 68 used for leakage calculation; Equation 34 was not used (since BEF method not selected as allowed by the methodology (p. 20); Equation 8 was not used because different AIM Step calculations were made.

Data Unit / Parameter:	$PB_{BB,it}$
Data unit:	Dimensionless
Description:	Average proportion of $C_{B,AC,it}$ burnt under the baseline scenario in stratum i, time t
Source of data:	methodology (p. 16)
Value applied:	1
Purpose of the data:	Used in Biomass Burning -BL E51
Any comment:	As per the methodology p. 16 “because the land is being cleared for another land use in the baseline scenario, all of the biomass that is not extracted as timber is assumed to be burned and therefore in this methodology the proportion burned in the baseline $P_{BBB,it}$ is assumed to be equal to 1.”

Data Unit / Parameter:	CE
Data unit:	Dimensionless
Description:	Average biomass combustion efficiency
Source of data:	IPCC default =0.50
Value applied:	0.50
Purpose of the data:	Used in Biomass Burning spreadsheet
Any comment:	

Data Unit / Parameter:	$A_{cleared\ B,it}$
Data unit:	Ha
Description:	Average annual area of deforestation by the baseline agent of deforestation for the 5 years prior to project implementation
Source of data:	GPS coordinates and/or remote sensing data and or/legal parcel records
Value applied:	Rate 2,800 ha yr^{-1} (stratum i, time t)
Purpose of the data:	
Any comment:	The expected annual rate of conversion was determined by analyzing historical rate of conversion by the baseline agent.

Data Unit / Parameter:	N/C ratio
Data unit:	Dimensionless
Description:	Nitrogen-carbon ratio
Source of data:	IPCC default = 0.01
Value applied:	0.01
Purpose of the data:	used in Biomass Burning spreadsheet
Any comment:	

Data Unit / Parameter:	ER_{N2O}
Data unit:	t CO_2-e (t C)$^{-1}$
Description:	Emission ratio for N_2O
Source of data:	IPCC default value =0.007
Value applied:	0.007
Purpose of the data:	see Biomass Burning spreadsheet
Any comment:	

Data Unit / Parameter:	ER_{CH4}
Data unit:	t CO_2-e (t C)$^{-1}$
Description:	Emission ratio for CH_4
Source of data:	IPCC default value = 0.012
Value applied:	0.012
Purpose of the data:	see Biomass Burning spreadsheet
Any comment:	

Data Unit / Parameter:	GWP_{N2O}
Data unit:	t CO_2-e (t N_2O)$^{-1}$
Description:	Global Warming Potential for N_2O
Source of data:	Methodology =298 for the second commitment period
Value applied:	298
Purpose of the data:	see Biomass Burning spreadsheet
Any comment:	Used in Equation 15. Equation 54 was not used – as palm oil plantations operate on a 25-30 year timeframe, emissions from harvest rotations were not considered in baseline estimation. This is conservative.

Data Unit / Parameter:	GWP_{CH4}
Data unit:	t CO2-e (t $CH_4)^{-1}$
Description:	Global Warming Potential for CH4
Source of data:	Methodology = 25 for the second commitment period
Value applied:	25
Purpose of the data:	see Biomass Burning spreadsheet
Any comment:	Used in Equation 16. Equation 55 is not calculated – as palm oil plantations operate on a 25-30 year timeframe, emissions from harvest rotations were not considered in baseline estimation. This is conservative.

Data Unit / Parameter:	DBH
Data unit:	cm
Description:	diameter at breast height of tree
Source of data:	Field Measurement.
Value applied:	See Carbon Survey Report data
Purpose of the data:	
Any comment:	Not used in Equation 24 and 25. DBH was used in allometric equation by Chave et al. (2005) to estimate aboveground biomass from survey plots to test/validate biomass estimation equations.

Data Unit / Parameter:	$A_{itplanted}$
Data unit:	Ha
Description:	area of biomass growth on future land use in the baseline scenario in stratum *i* at time *t*
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	Rate 2,800 ha yr^{-1}
Purpose of the data:	Based on historical rate of plantation conversion by the baseline agent. See discussion Baseline Report. For values see oil palm regrowth worksheet. Annual area of planting cohorts A-F shown in columns E, I, M, Q, U, Y.
Any comment:	Strata based on concession boundaries. Time based on staggered concession development and planting north to south.

Data Unit / Parameter:	age_{peak}
Data unit:	Years
Description:	age of stand at peak production
Source of data:	Literature values: Data reported in Cannell M.G. R. 1982. World Forest Biomass and Primary Production Data. Academic Press. London. 391 pp.
Value applied:	14
Purpose of the data:	See discussion Baseline Report Oil Palm Growth Model Data
Any comment:	

Data Unit / Parameter:	$D_{B,,drain,it}$
Data unit:	cm
Description:	average depth of peat drainage or average depth to water table under the baseline scenario in stratum i, time t
Source of data:	Methodology default value = 100 cm
Value applied:	100
Purpose of the data:	See Peat Drainage spreadsheet
Any comment:	Note that peat depth across the project area is greater than the peat depth lost via subsidence and burning in the baseline scenario over the project life, therefore the net peat drainage depth of no more than 1 meter is used - Condition F of the methodology.

Data Unit / Parameter:	$A_{B,drain,it}$
Data unit:	Ha
Description:	area of drainage impact under the baseline scenario in stratum i, time t
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	See Peat Drainage spreadsheet
Purpose of the data:	
Any comment:	Note peat drainage emissions are cumulative, expanding to cover the full extent of concessions, then continuing over the life of the project.

Data Unit / Parameter:	D_{peat}
Data unit:	Meters
Description:	average depth of peat in project area
Source of data:	Field Measurements
Value applied:	4.3
Purpose of the data:	See Carbon Survey Report
Any comment:	

Data Unit / Parameter:	$D_{B,burn,it}$
Data unit:	cm
Description:	Depth of peat burned under the baseline scenario in stratum i at time t;
Source of data:	Literature value: Couwenberg et al. (2009) cited in the methodology p. 36
Value applied:	34cm
Purpose of the data:	
Any comment:	According to the methodology p. 37 “The depth of peat burned shall be assumed to be equal to the drainage depth, minus a critical threshold of 40 cm above the drainage depth. If the difference between drainage depth and the critical threshold exceeds 34 cm, then the maximum burn depth of 34 cm shall be applied.” Since drainage depth for the baseline is 100cm, a burn depth of 34 cm is used.

Data Unit / Parameter:	$A_{B,burn,it}$
Data unit:	Ha
Description:	Area of peat burned under the baseline scenario in stratum i at time t;
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	See Peat Burning spreadsheet
Purpose of the data:	
Any comment:	

Data Unit / Parameter:	BD_i
Data unit:	g cm^{-3} = t m^{-3}
Description:	Bulk density of peat in stratum i (g cm3 = t m3)
Source of data:	Default value
Value applied:	0.1505
Purpose of the data:	Site specific values of peat bulk density are applied to all peat vegetation strata in the project area. Ex-post this value will be listed as the default value for all peat strata until (as required by the methodology) new data become available.
Any comment:	As this site specific value of peat bulk density if higher than the default value it is conservative to use it in the ex-post scenario.

Data Unit / Parameter:	EF_{CO2}
Data unit:	g CO_2 (t peat)$^{-1}$
Description:	CO_2 emissions from the combustion of peat
Source of data:	Literature value. Muraleedharan et al. (2000) cited in the methodology p. 38
Value applied:	185,000
Purpose of the data:	Peat Burning spreadsheet
Any comment:	

Data Unit / Parameter:	EF_{CH4}
Data unit:	g CH_4 (t peat)$^{-1}$
Description:	CH4 emissions from the combustion of peat
Source of data:	Literature value
Value applied:	5,785 g/ton peat
Purpose of the data:	Peat Burning – BL worksheet cell E6
Any comment:	

Data Unit / Parameter:	LDF
Data unit:	t C m^{-3}
Description:	Logging Damage Factor for calculating the biomass of dead wood created during logging operations per cubic meter extracted
Source of data:	Default value of 0.37 t C m^{-3} from 534 logging gaps measured by Winrock International in Bolivia, Belize, Mexico, the Republic of Congo, Brazil and Indonesia may be used for tropical broadleaf forests.
Value applied:	0.37
Purpose of the data:	Used in Equation 68 of VM0004
Any comment:	

Data Unit / Parameter:	PML_{FT}
Data unit:	%
Description:	Mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type to which displacement of logging activities is likely to occur.
Source of data:	GIS data from landcover/forest maps published by Ministry of Forestry. All forest types in which commercial logging could take place within PT Best concessions were considered.
Value applied:	< 0.20
Purpose of the data:	
Any comment:	There is minimal remaining forest in PT BEST concessions outside Rimba Raya, therefore a relative value of < 0.20 was sufficient for determining that PML_{FT} is > 0.15 less than PMP_i (methodology p. 41) and therefore the highest market leakage deduction factor is selected and applied. This results in the most conservative (largest) deduction from the baseline estimate for market leakage as a result of Rimba Raya's comparatively high timber volume being removed from PT BEST concession's timber potential.

Data Unit / Parameter:	$V_{B,it}$
Data unit:	m^3
Description:	Volume of timber projected to be extracted from within the project boundary during the baseline in stratum i at time t
Source of data:	Source of data same as biomass logged parameter.
Value applied:	Embedded in Equation 68, see biomass burning spreadsheet
Purpose of the data:	Note that this volume does not include logging slash left onsite. Extracted volumes reported are gross volumes removed.
Any comment:	

Data Unit / Parameter:	PMP_i
Data unit:	%
Description:	Merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundaries
Source of data:	unpublished data from Mawas, Winrock 2008
Value applied:	Mean 0.36, SD 0.169
Purpose of the data:	Same as B logged (Biomass Extracted as Merchantable Timber >30cm in Timber Extraction spreadsheet)
Any comment:	Mawas data provides complete dataset applicable to Rimba Raya project site. Average proportion of merchantable timber across 93 logging gaps

Data Unit / Parameter:	$HistHa_i$
Data unit:	Ha
Description:	Average annual area of deforestation by the baseline agent of the planned deforestation in stratum i for the 5-10 years prior to project implementation
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	6113.7
Purpose of the data:	See discussion Baseline Report
Any comment:	

Data Unit / Parameter:	$A_{defLK,it}$
Data unit:	Ha
Description:	The total area of deforestation by the baseline agent of the planned deforestation in stratum i at time t
Source of data:	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation
Value applied:	Not calculated as of year 1 (no leakage)
Purpose of the data:	Legal records will include government permits to deforest including concession licenses.
Any comment:	Ex-ante, project proponents shall determine and justify the likelihood of leakage based on characteristics of the baseline agent. To be calculated if activity shifting leakage is detected. See Monitoring plan discussion.

5.3 Data and Parameters Monitored (CL3, CM3 & B3)

Data Unit / Parameter:	$N_{gapsP,\ it}$
Data unit:	Dimensionless
Description:	Number of logging gaps detected in stratum i, time t in the project area
Source of data:	Remote sensing and field data
Description of measurement methods and procedures to be applied:	Patrols frequently visit known forest access points to discourage and eliminate logging. When logging events are found, each stump is counted and the diameter of the stump measured to compare with the default 'logging gap' estimate of biomass loss.
Frequency of monitoring/recording:	Revisit annually.
Value monitored:	The number of gaps (i.e. individual trees removed) in each monitoring period
Monitoring equipment:	LandSAT images GPS Diameter tapes
QA/QC procedures to be applied:	
Calculation method:	Methodology Equation
Any comment:	

Data Unit / Parameter:	$L_{log,tr,tk}$
Data unit:	M
Description:	Length of log extracted from timber tree tr in stratum i, gap k, measured as the distance from stump to base of crown, less the length of any pieces of bole left on site
Source of data:	Field visit
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$D_{bottom,tr,ik}$
Data unit:	Cm
Description:	Diameter at the stump end of log extracted from timber tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$D_{top,tr,ik}$
Data unit:	Cm
Description:	Diameter at the crown end of log extracted from timber tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	ϕ_i
Data unit:	t m^{-3}
Description:	Wood density of extracted log in stratum *i*
Source of data:	Literature Value: Reyes, Brown, Chapman and Lugo (1992) mean wood density for tropical Asia represented by 428 species, SE = 0.007
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.57 (SD = 0.145)
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	CF
Data unit:	Dimensionless
Description:	Carbon fraction of dry matter (extracted log)
Source of data:	IPCC default = 0.50
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.50
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	$D_{s,tr,ik}$
Data unit:	Cm
Description:	Diameter of the stump of the logged timber tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$H_{tr,ik}$
Data unit:	M
Description:	Height of tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$D_{pce\text{-}b,tr,ik}$
Data unit:	Cm
Description:	Diameter of bottom end of piece left from timber tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$L_{pce,tr,ik}$
Data unit:	M
Description:	Length of piece left from timber tree tr in stratum i, gap k
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$D_{pce\text{-}t,tr,ik}$
Data unit:	Cm
Description:	Diameter of top end of piece pce left from timber tree tr in stratum i, gap k: cm
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$D_{logging\ drain,it}$
Data unit:	Cm
Description:	Average depth of peat drainage or average depth to water table in drained area of stratum i, time t during the dry season
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

Data Unit / Parameter:	$A_{logging\ peatimpact,it}$
Data unit:	Ha
Description:	Area of drainage impact in stratum i, time t
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	
Value monitored:	
Monitoring equipment:	
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire and Logging Gaps
Calculation method:	After consulting with peat expert apply buffer in GIS software
Any comment:	

Data Unit / Parameter:	CE
Data unit:	Dimensionless
Description:	Average biomass combustion efficiency
Source of data:	IPCC default =0.50
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.50
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	$MC_{burnedP,AG,it}$
Data unit:	t C ha^{-1}
Description:	Estimated aboveground carbon stock after burning under the project case for stratum i, time t
Source of data:	Conservatively assume complete loss of aboveground biomass and no regrowth.
Description of measurement methods and procedures to be applied:	Annual remote sensing of burnt areas used to estimate aboveground biomass loss. Done in conjunction with annual landcover change analysis and monitoring of MODIS hotspots.
Frequency of monitoring/recording:	
Value monitored:	n/a (not measured)
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	Area burnt in each strata multiplied by the biomass estimate for that strata
Any comment:	

Data Unit / Parameter:	N/C ratio
Data unit:	Dimensionless
Description:	Nitrogen-carbon ratio
Source of data:	IPCC default=0.01
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.01
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	ER_{N20}
Data unit:	t CO_2-e (t C)$^{-1}$
Description:	Emission ratio for N_2O
Source of data:	IPCC default value=0.007
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.007
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	ER_{CH4}
Data unit:	t CO_2-e (t C)$^{-1}$
Description:	Emission ratio for CH_4
Source of data:	IPCC default value = 0.012
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	0.012
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	GWP_{N2O}
Data unit:	t CO_2-e (t N_2O)$^{-1}$
Description:	Global Warming Potential for N_2O
Source of data:	Methodology = 298 for the second commitment period
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	298
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	GWP_{CH4}
Data unit:	t CO_2-e (t CH4)$^{-1}$
Description:	Global Warming Potential for CH_4
Source of data:	Methodology = 25 for the first commitment period
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	25
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	$A_{p,burn,it}$
Data unit:	Ha
Description:	Area burned in stratum i, time t in the project area
Source of data:	Field measurements or using high resolution digital aerial imagery
Description of measurement methods and procedures to be applied:	GIS analysis of satellite imagery and ground-truth data
Frequency of monitoring/recording:	Once during 2010- 2013. Annual from 2013.
Value monitored:	Array
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	High resolution images were not able to be accessed for effected areas due to cloud cover in this monitoring period. Therefore ground trothing of medium resolution LandSAT was undertaken.

Data Unit / Parameter:	$D_{P,burn,it}$
Data unit:	Cm
Description:	Depth of peat burned under the project scenario in stratum i at time t:
Source of data:	Methodology default value
Description of measurement methods and procedures to be applied:	The upper range of the methodology default value was applied (i.e. 55cm). This was validated with limited field measurements and further supported by relevant peer reviewed research in the same region as the Project Area.
Frequency of monitoring/recording:	NA
Value monitored:	55cm
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	Methodology literature value applied and validated in the field.
Any comment:	NA

Data Unit / Parameter:	BD_i
Data unit:	g cm^{-3} = t m^{-3}
Description:	Bulk density of peat in stratum i
Source of data:	Field work conducted in project area
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	This parameter is not monitored but rather applied consistently throughout the Project.
Value monitored:	Value to be applied is: 0.1505 g cm^{-3} = t m^{-3}
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	Site specific values of peat bulk density are applied to all peat vegetation strata in the project area. Ex-post this value will be listed as the default value for all peat strata until (as required by the methodology) new data become available.
Any comment:	As this site specific value of peat bulk density if higher than the default value it is conservative to use it in the ex-post scenario.

Data Unit / Parameter:	EF_{CO2}
Data unit:	g CO_2 (t peat)$^{-1}$
Description:	CO_2 emissions from the combustion of peat
Source of data:	Literature value: Muraleedharan et al. (2000) cited in Methodology p. 38
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	185,000 g CO_2 (t peat)$^{-1}$
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	$EFCH_4$
Data unit:	g CH_4 (t peat)$^{-1}$
Description:	CH4 emission from the combustion of peat
Source of data:	Literature value: Muraleedharan et al. (2000) cited in Methodology p. 38
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value monitored:	5,785 g CH_4 (t peat)$^{-1}$
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	NA

Data Unit / Parameter:	$A_{P, LCC, it}$
Data unit:	Ha
Description:	Area that underwent land cover change in stratum i, monitoring year t:
Source of data:	High resolution digital aerial imagery or field measurements
Description of measurement methods and procedures to be applied:	GIS and satellite image analysis
Frequency of monitoring/recording:	Twice between 2010 and 2013. Annual from 2013 onwards.
Value monitored:	Array
Monitoring equipment:	
QA/QC procedures to be applied:	Orthorectifed images must be used
Calculation method:	
Any comment:	

Data Unit / Parameter:	$A^{LCCn}_{peatimpact,it}$
Data unit:	Ha
Description:	Area of drainage impact due to land cover change in stratum i, monitoring year t
Source of data:	Medium/high resolution imagery combined with field measurements as appropriate.
Description of measurement methods and procedures to be applied:	Calculated in GIS using the geoprocessing buffer function
Frequency of monitoring/recording:	
Value monitored:	Array
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	The method involves mapping the extent of the drainage and buffering by anticipated area of impact based on available science/expert opinion at the time. The area under the buffer that occurs inside the Carbon Accounting Area is considered the area of drainage impact.
Any comment:	

Data Unit / Parameter:	$D_{LCC\ drain,it}$
Data unit:	Cm
Description:	Average depth of peat drainage or average depth to water table in the deforested area under the project scenario in stratum i, time t
Source of data:	Field measurements or estimated from literature values if measurements not available.
Description of measurement methods and procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Frequency of monitoring/recording:	At impact
Value monitored:	Even though the description state the average should be used, the maximum drainage depth recorded of 60cm was applied.
Monitoring equipment:	Tape Measure and Measuring pole
QA/QC procedures to be applied:	Refer to Standard Operating Procedure - Monitoring for Fire, Logging Gaps and Land Cover Change
Calculation method:	
Any comment:	

6 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

6.1 Baseline Emissions (G2)

The baseline emissions were calculated ex-ante and are presented in Table 13.

Table 13: Rimba Raya Baseline Emissions

Yr of Project	Em. from timber (t CO_2-e)	Em. from biomass burning (t CO_2-e)	Growth of oil palm (t CO_2-e)	Em. from peat burning (t CO_2-e)	Em. from peat drainage (t CO_2-e)	Total CO_2-e baseline emissions (t CO_2-e)	Market Leakage Deduction (t CO_2-e)	Total emissions after Market Leakage deduction (t CO_2-e)	Total cumulative CO_2-e emissions (t CO_2-e)
1	558,684	557,304		764,128	582,096	2,462,212	0	2,462,212	2,462,212
2	942,209	932,655		1,269,325	1,708,385	4,852,575	(1,198,394)	3,654,181	6,116,393
3	691,873	932,655	(65,314)	1,269,325	2,785,138	5,613,677	(2,021,067)	3,592,611	9,709,003
4	62,147	749,749	(161,729)	1,018,935	3,939,956	5,609,057	(1,484,087)	4,124,970	13,833,973
5		512,836	(301,696)	700,845	4,578,892	5,495,876	(133,306)	5,362,569	19,196,543
6		222,239	(467,616)	368,692	4,915,015	5,038,330		5,038,330	24,234,873
7			(635,119)		4,915,015	4,279,896		4,279,896	28,514,769
8			(776,046)		4,915,015	4,138,969		4,138,969	32,653,738
9			(888,679)		4,915,015	4,026,336		4,026,336	36,680,074
10			(934,685)		4,915,015	3,980,330		3,980,330	40,660,403

6.2 Project Emissions

Project Emissions from three sources (selective logging- degradation, fire and deforestation) are calculated in accordance Equations 89 and 90 of VM0004.[6]

$$C_{PRJ} = \sum_{t=1}^{t^*} \sum_{i=1}^{m_{PS}} C_{P,it} \qquad \text{VM0004 – 89}$$

$$C_{P,it} = E_{P,it}^{logging} + E_{P,it}^{fire} + E_{P,it}^{LCC} \qquad \text{VM0004 – 90}$$

where;

C_{PRJ}	sum of emissions that occur within the project boundary as a result of emissions that were unanticipated and/or unable to be avoided by project activities; tCO_2-e
$C_{P,it}$	sum of emissions that occur within the project boundary in stratum *i* at time *t* as a result of emissions that were unanticipated and /or unable to be avoided by project activities; tCO_2-e
$E_{P,it}^{logging}$	GHG emissions due to logging in stratum *i*, time *t*; tCO_2-e
$E_{P,it}^{fire}$	GHG emissions due to fire in stratum *i*, time *t*; tCO_2-e
$E_{P,it}^{LCC}$	GHG emissions due to land use/land cover change in stratum *i*, time *t*; tCO_2-e
i	1,2,3,…..m_{PS} strata
t	1,2,3,…t* years

This calculation is performed in the monitoring calculation spreadsheet on Tab "Summary Emissions Table", column H.

6.2.1 Estimation of GHG emissions due to selective logging ($E_{P,it}^{logging}$)

The GHG emissions attributable to logging within the project boundary over the monitoring period are estimated is accordance with Equation 91 of VM0004.

$$E_{P,it}^{logging} = \left(N_{P,it}^{gaps} \times EF_{logging,i}\right) + E_{drainage,it}^{logging} \qquad \text{VM0004 – 91}$$

where;

$E_{P,it}^{logging}$	GHG emissions due to logging in stratum *i*, time *t*; tCO_2-e
$N_{P,it}^{gaps}$	number of logging gaps detected in stratum *i*, *time t*, in the project area; dimensionless

6 See page 71 of VM0004.

$EF_{logging,i}$	average logging emission factor for stratum *i*,; tCO_2-e (logging gap)$^{-1}$
$E^{logging}_{drainage,it}$	CO_2 emissions from peat drainage in stratum *i*, time *t*; tCO_2-e

This calculation is performed in the monitoring calculation spreadsheet on Tab "Summary Emissions Table", column C.

In accordance with the methodology the Logging Gap Emissions Factor was estimated at the beginning of the project and is described in the validated Monitoring Plan[7]. Therefore only the activities involved with monitoring existing canals and identifying new areas of illegal logging in the Carbon Accounting Area are covered in this Section.

Survey and calculation methods comprised five steps:

Step 1: Detect all logging gaps

In accordance with the methodology the logging gaps identified in the baseline were revisited in 2013 to survey the state and extent of ongoing logging in these areas[8].

In addition new logging gaps were detected from the LandSAT imagery and ground surveys.

Step 2. Conduct surveys of timber extracted at logging sites

During field survey it was found the canals had not been extended nor had any new trees been extracted Refer to supporting reports which can be made available on request.

At the new logging gaps identified no new canals had been dug but tree had been extracted. All logging gaps were counted and measurements of stump diameter taken Refer to supporting reports which can be made available on request.

Step 3. Estimate an average logging emissions factor for each stratum

There were 208 logging gaps identified in the Project Area in the monitoring period. **The emissions associated with the logging gaps totaled 1144 tCO_2-e.**

This calculation is performed in the monitoring calculation spreadsheet on Tab "Timber Extraction 2010_14", column N; cell 15.

[7] See Monitoring Plan Section 10.
[8] See Annex 2 for full report on field survey.

Step 4. Calculate CO_2 emissions from peat drainage

No new canals were identified in the Project Area. The emissions from peat drainage were based on the tracklogs of travelling the extent of the canals in 2014[9] combined with the applied buffer of 500m to determine the area of impact from the peat drainage. This approach is very conservative as the field visits to the existing logging canals indicated that these canals are no longer in use and are being overgrown with vegetation.

Table 14:Buffer area around existing canals (not extended in current Monitoring Period)

Soil Classification	Stratum	Canal 1 Area	Canal 2 Area	Canal 3 Area	Total
non-peat	Data gap	0	0	0	0
non-peat	Coastal forest	0	0	0	0
non-peat	Grass	0	0	0	0
non-peat	Low, sparse veg.	0	29	0	29
peat	Peat swamp forest	318	44	121	**483**
non-peat	Riparian forest	0	0	0	0
peat	Shrubland	11	264	100	**364**
non-peat	Water	0	21	20	40
non-peat	Wetlands	49	47	109	205
	Total	**378**	**404**	**349**	**1122**

The total area of peat soil impacted per year was determined to be **847 hectares.**

The following equations were subsequently applied:

$$E^{logging}_{drainage,it} = A^{logging}_{dd,itpeatimpact,it} \times ME^{logging}_{dd,it}$$ VM0004 – 107

and:

$$ME^{logging}_{dd,it} = f\left(D^{logging}_{drain,it}\right)$$ VM0004 – 108

where;

$E^{logging}_{drainage,it}$	CO_2 emissions from peat in stratum i at time t; t CO_2-e
$A^{logging}_{peatimpact,it}$	area of drainage impact in stratum i, time t; ha
$ME^{logging}_{dd,it}$	mean CO_2 emissions from drained peat in stratum i, time *t*; t CO_2-e ha^{-1}

[9] Refer to methodology page 78 Step 7 which states that the canals should be regularly monitored to account for changes in total length and potential expansion.

$D_{drain,it}^{logging}$ average depth of peat drainage or average depth of water table in drained area of stratum i, time t during the dry season, cm

Ex-post calculations relied on the linear drainage function presented in the PD;

$$f(D_{drain,it}^{loc}) = 0.91 D_{drain,it}$$ [10]

The total emissions from logging canals in the project area was subsequently estimated to be 82,780 t CO_2-e; the same as last reporting period.

Calculations are performed in the calculation spreadsheet on the tab titled "LoggingDrainage 2010-2014, column G; row 20"

Step 5. Calculate GHG emissions attributable to logging

The total emissions attributable to logging in the Project Area was determined to be 83,924 t CO_2-e.

The summation calculation is performed in the calculation spreadsheet on the tab titled "SummaryMonitoringEmissions, column B; row71"

6.2.2 GHG Emissions due to fire (E_{it}^{fire})

All fires that occur within the project boundary must be reported over the life of the Project and the associated GHG emissions from both biomass burnt and peat burnt resulting from these fires must be accounted for.

Step 1: Determine presence/absence of burning and monitor area burnt within project boundary

Monitoring for fire using Landsat images was conducted for the period 2013 – 2014.

According to the methodology, if fires are detected within the Project boundary (or within a 1km buffer of the project boundary[11]) high resolution or georeferenced ground measurements shall be collected over these areas and the location of the area of all fire scars shall be calculated and recorded.

During the monitoring period a total of 343 hectares was burnt (Table 15) within the carbon accounting area.

[10] This is the same function applied in the baseline scenario.
[11] There is no further guidance on how to treat fires detected in the 1km buffer around the project area. Therefore we have tracked them but have not accounted for GHG emissions form these fires as they are outside the Carbon Accounting Area.

Table 15: Burned area per land cover class for the years 2013 – 2014.

Land cover class	**Area burned 2013**
Data gap	0.7 ha
Coastal forest	1.1 ha
Grass	27.2 ha
Low, sparse veg.	180.9 ha
Peat swamp forest	0.4 ha
Riparian forest	0 ha
Shrubland	139.2 ha
Water	0 ha
Wetlands	43.4 ha
Sum	**343 ha**

Georeferenced ground measurements were collected at a number of burnt areas. Field visits to these areas confirmed that all visited locations had experienced fire as expected.

Step 2: Estimate an average fire emissions factor ($EF_{fire,it}$)

Emissions from fire including emissions from both biomass and peat burn and are estimated by applying Equation 110 from the methodology.

$$EF_{fire,it} = EF_{P,BiomassBurn,it} + EF_{P,PeatBurn,it} \qquad \text{VM0004 – 110}$$

where:

$EF_{fire,it}$ average fire emissions factor for stratum *i*, monitoring year t, tCO_2-e ha^{-1} burnt

$E_{P,BimassBurn,it}$ total increase in CO_2-e emission as a result of aboveground biomass burning in stratum *i*, monitoring year *t*; t CO_2-e ha^{-1} burnt

$EF_{P,PeatBurn,it}$ total increase in CO2-e emissions as a result of peat burning in stratum *i*, monitoring year *t*, tCO_2-e ha^{-1} burnt

This calculation is performed in the monitoring calculation spreadsheet on Tab “Summary Monitoring Table”, column C; rows 62-70 .

6.2.2.1 Emissions from Biomass Burn

Emissions from biomass burn are estimated through the application of Equation 111 from the methodology.

$$EF_{P,BiomassBurn,it} = EF_{P,BiomassBurnCO2,it} + EF_{P,BiomassBurn,N2O,it} + EF_{P,BiomassBurn,CH4,it}$$ VM0004 - 111

where:

$EF_{P,BiomassBurn,it}$	total increase in CO_2-e emissions as a result of aboveground biomass burning in the project case in stratum *i*, monitoring year *t*; tCO_2-e ha^{-1} burnt
$EF_{P,BimassBurn,CO2,it}$	CO_2 emissions from biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
$EF_{P,BimassBurn,CO2,it}$	N_2O emissions from biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
$EF_{P,BimassBurn,CH4,it}$	CH_4 emissions from biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt

This calculation is performed in the monitoring calculation spreadsheet on Tab "ABBiomassBurn2014", column J.

The t CO_2-e emissions resulting from fire are dependent on the proportion of carbon stocks burned and the combustion efficiency (CE). Average aboveground carbon stocks of the land cover stratum after fire were derived from conservative default values[12].

Default combustion efficiencies were selected from Table 2.6 of the IPCC AFOLU Guidelines and are reported in the parameter tables listed in Section 5.3..

As no field measurements were available for carbon stock directly after burning, the CO_2e emission factor for biomass in stratum i was conservatively estimated as the t CO_2e of the mean baseline aboveground carbon stock of the stratum in which fire was detected according to Equation 114.

And

$$EF_{P,BiomassBurnCO2,it} = (MC_{B,AG,it}) \times \frac{44}{12}$$ VM0004 – 114

where:

$E_{P,BimassBurn,CO2,it}$	CO_2 emissions form biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
$MC_{B,BB,AG,it}$	average aboveground biomass carbon stock in the baseline scenario for stratum *i*, time *t*; t CO_2-e
$44/12$	ration of molecular weights to CO_2 and carbon; dimensionless

[12] As allowed by the methodology, see section 19.2.2, Step 2a page 80.

This calculation is performed in the monitoring calculation spreadsheet on Tab "ABBiomassBurn2013_2014", column F.

Non –CO_2 emissions factors were calculated using Equation 115 and 116.

$$EF_{P,BiomasBurn,N2O,it} = EF_{P,BiomassBurn,CO2,it} \times \frac{12}{44} \times \left({}^{N}/_{Cratio}\right) \times ER_{N2O} \times {}^{44}/_{12} \times GWP_{N2O}$$ VM0004 - 115

$$EF_{P,BiomasBurn,CH4,it} = EF_{P,BiomassBurn,CO2,it} \times \frac{12}{44} \times ER_{CH4} \times {}^{16}/_{12} \times GWP_{CH4}$$ VM0004 - 116

where;

$E_{P,BimassBurn,CO2,it}$	CO_2 emissions form biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
$EF_{P,BimassBurn,CO2,it}$	N_2O emissions from biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
$EF_{P,BimassBurn,CH4,it}$	CH_4 emissions from biomass burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e ha^{-1} burnt
${}^{N}/_{Cratio}$	nitrogen-carbon ratio (IPCC default = 0.01); dimensionless
ER_{N2O}	emission ratio for N_2O (IPCC default value =0.007); t CO_2-e (t C)$^{-1}$
ER_{CH4}	emission ratio for CH_4 (IPCC default value =0.012); t CO_2-e (t C)$^{-1}$
GWP_{CH4}	Global Warming Potential CH_4 (= 25 for the first commitment period); t CO_2-e (t CH_4)$^{-1}$
GWP_{N2O}	Global Warming Potential N_2O (= 298 for the first commitment period); t CO_2-e (t N_2O)$^{-1}$

This calculation is performed in the monitoring calculation spreadsheet on Tab "ABBiomassBurn2013_2014", column G and H.

6.2.2.2 Emissions from Peat Burn

Emissions from peat burn are estimated through the application of Equations 117 – 120.

$$EF_{P,PeatBurn,it} = EF_{P,Peat\,Burn,CO2,it} + EF_{P,PeatBurnCH4,it}$$ VM0004 - 117

And:

$$EF_{P,Peat\,Burn,CO2,it} = \frac{M_{F,peat,it} \times EF_{CO2}}{10^6}$$ VM0004 - 118

$$EF_{P,Peat\,Burn,CH4,it} = \frac{M_{F,peat,it} \times EF_{CH4}}{10^6} \times GWP_{CH4}$$ VM0004 - 119

$$M_{P,it} = D_{P,Burn,it} \times 10{,}000 \times BD_i$$ VM0004 - 120

where:

$E_{P,PeatBurn,it}$	total increase in CO_2-e emissions as a result of peat burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e
$E_{P,PeatBurn,CO2,it}$	total CO_2 emissions from peat burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e
$EF_{P,PeatBurn,CH4,it}$	total CH_4 emissions from peat burning under the project case in stratum *I*, monitoring year *t;* t CO_2-e
$M_{P,peat,it}$	mass of peat burned under the project scenario in stratum I, time t; tons
EF_{CO2}	CO_2 emissions from the combustion of peat, g CO_2 / ton peat
EF_{CH4}	CH_4 emissions from the combustion of peat, g CH_4 / ton peat
GWP_{CH4}	Global Warming Potential CH_4 (= 21 for the first commitment period); t CO_2-e (t CH_4)$^{-1}$
$D_{P,burn,it}$	depth of peat burnt under the project scenario in stratum *i* at time *t*; meters
BD_i	bulk density of peat in stratum *I* (g cm^{-3} = tm^{-3})

This calculation is performed in the monitoring calculation spreadsheet on Tab “PeatBurn” column G,H,I,J row 50-58.

The depth of peat burn was conservatively estimated based on literature values as allowed by the methodology[13]. The conservative upper end of the range reported in literature (i.e. 55cm) was applied.

As literature values were applied, verification of this value was undertaken to meet the requirements of the methodology. The methodology allows a verification approach using peat burn depth collected from a limited number of locations to ensure the actual burn depths measured fall within the uncertainty range of the literature value applied. These limited number (9) of ground points found that peat burn depth did not exceed 10cm. Refer to supporting reports which can be made available on request.

Also of note are published results from research into peat burn depth in the vicinity of the Project Area. Research conducted by Ballhorn, et al, 2009 identifies the challenges of quantifying the role of peatland fires in the release of carbon, especially in the highly inaccessible peatlands of Indonesia. This study used LIDAR and limited ground measurements to obtain spatial measurements on burn depth across large fire scars, light detection and ranging (LIDAR) aerial remote sensing was used.

The results of the study found that LIDAR has the ability to collect sufficiently accurate and spatially representative measurements of the peat burn scar depths over large areas in very

[13] See VM004, Section 19.2.2, Step 2b, page 83.

inaccessible terrain. The study found an average burn depth of 33 cm. This average burn depth is also consistent with the methodology default figure of 34cm.

Emissions factors for CO_2 and CH_4 were estimated using the baseline methodology default figures. The emissions factors for peat combustion at the lowest temperature were applied to result in higher (conservative) project emissions.[14]

6.2.3 GHG Emissions due to land clearing ($E_{P,it}^{LCC}$)

LandSAT imagery was used to detect deforestation not due to fire or logging within the Carbon Accounting Area.

The GHG emissions attributable to deforestation are estimated according to Equation 121.

$$E_{P,it}^{LLC} = \sum_{t=1}^{t*} \sum_{i=1}^{Mps} \left(A_{P,LCC,it} \times EF_{P,LCC,AG,it}\right) + \left(A_{peatimpact,it}^{LCC} \times EF_{peatdrainage,it}\right)$$ VM0004 - 121

where;

$E_{P,it}^{LLC}$	GHG emissions due to land cover change in the project area; tCO_2-e
$A_{P,LCC,it}$	GHG emissions due to land cover change in the project area; t CO_2-e
$A_{peatimpact,it}^{LLC}$	area of drainage impact due to land cover change in stratum *i*, monitoring year *t*; ha
$EF_{P,LCC,AG,it}$	average deforestation emission factor for stratum *i*, monitoring year *t*; t CO_2-e ha^{-1}
$EF_{Peat\ drainage,it}$	average peat drainage emission factor for stratum *i*, monitoring year *t*; t CO_2-e ha^{-1}

All calculations are performed in the calculation spreadsheet on the tab titled "Deforestation2013_2014"

Step 1: Monitor area deforested and area of impact of peat drainage

Within the Carbon Accounting Area and a 3km buffer zone surrounding the project area, deforestation was spatially delineated using Landsat imagery and tracked using an accuracy assessment of 80% or more.

In accordance with the methodology it was conservatively assumed that the area affected by land cover change (not related to fire or logging) was equal to 100% of the converted area ($A_{P,LLC,it}$).

[14] There is a mistake in the methodology that states "applying the emission factors at the higher temperature thresholds leads to higher emissions". This is the opposite of what is true. Emissions factors for the lower temperatures leads to higher emissions. Subsequently the lower temperature emission factors were conservatively applied in the Project scenario.

Fire was the cause of 0.2 hectares of deforestation in the project area. Emissions from deforestation from fire are accounted for in Section 6.2.2. A total of 514.9 hectares of non-fire related deforestation was detected during the monitoring period.

The distribution of the deforested area within the various land cover classifications is presented in Table 16.

Table 16: Deforestation within the carbon accounting area not attributed to fire

Land Classification 2013	Land Classification 2014	A(LCC)
Peat Swamp Forest	Grass	12
Peat Swamp Forest	Low, sparse veg.	28
Peat Swamp Forest	Shrubland	447
Peat Swamp Forest	Water	3
Peat Swamp Forest	Wetlands	17
Riparian Forest	Shrubland	5.67
Riparian Forest	Low, sparse veg	2.23
TOTAL		**514.9**

This deforestation activity is predominately being driven by the local communities in the southern end of the Project Area.

Deforestation activities within the Project Area on peatland were largely converted to shrubland. There was no conversion to plantation and the associated peat drainage activities did not occur. Therefore emissions from the deforestation activities in peat swamp forest only impacted on aboveground biomass.

1. **Emissions from Biomass as a result of deforestation**

The total emissions resulting from deforestation are calculated as the difference between the aboveground biomass of the land cover class prior to deforestation and the land cover class following deforestation.

This calculation is performed in the monitoring calculation spreadsheet on Tab “Deforestation 2013_2014”, column O.

6.3 Treatment of Uncertainty Ex-Post

The parameters listed in Table 17 require uncertainty to be estimated (or conservative values used) in the ex-post calculations[15].

Table 17: Parameters for which uncertainty shall be estimated ex-post

Parameter	Description	Equation	Uncertainty Rating	Justification
Area Uncertainty				
$N_{F,it}^{gaps}$	number of logging gaps detected in stratum *i*, *time t*, in the project area; dimensionless	91	16%	From worst case confusion matrix in Appendix 4.
$A_{peatimpact,it}^{logging}$	area of drainage impact in stratum i, at time t; ha	107	16%	From worst case confusion matrix in Appendix 4.
$A_{P,burn,it}$	area burned in stratum *i*, time *t* in the project area; ha	109	16%	From worst case confusion matrix in Appendix 4.
$A_{P,LCC,it}$	GHG emissions due to land cover change in the project area; t CO_2-e	121	16%	From worst case confusion matrix in Appendix 4.
$A_{peatimpact,it}^{LCC}$	area of drainage impact due to land cover change in stratum *i*, monitoring year *t*;	121	16%	From worst case confusion matrix in Appendix 4.
$EF_{logging}$	average logging emissions factor for stratum i; tCO_2-e (logging gap)$^{-1}$	91	8.1%	Refer to calculation conducted in M2 calculation spread sheet. Based on actual measurements taken in the field and used in the baseline and first monitoring period.
Aboveground C Uncertainty				
$M_{B,AG,it}$	Average aboveground biomass carbon stock in the baseline scenario for stratum i, monitoring year t; t C ha^{-1}	114	30%	
$MC_{P,AG,it}^{burned}$	Estimated aboveground carbon stock after burning under the project case for stratum i, time t;	113	0	Equation 112 is not applied. The project conservatively assumes that the biomass burnt is equivalent to the

[15] From VM004 Section 19.3 Figure 4, page 87.

Parameter	Description	Equation	Uncertainty Rating	Justification
	t C ha^{-1}			mean baseline aboveground biomass stock of the stratum in which the fire was detected and applies equation 114.
$PBB_{F,it}$	Average proportion of $M_{B,BB,AG,it}$ burnt under the project case for stratum I, time t, monitoring year t; $tCha^{-1}$	112	0	Equation 112 is not applied. The project conservatively assumes that the biomass burnt is equivalent to the mean baseline aboveground biomass stock of the stratum in which the fire was detected and applies equation 114.
CE	Average biomass combustion efficiency (IPCC default = 0.5); dimensionless	112	0	Equation 112 is not applied. The project conservatively assumes that the biomass burnt is equivalent to the mean baseline aboveground biomass stock of the stratum in which the fire was detected and applies equation 114.
Peat Uncertainty				
$D_{F,burn,it}$	depth of peat burnt under the project scenario in stratum *i* at time *t*; meters	120	0%	Methodology default value applied and validated by field measurement, therefore uncertainty = 0%
BD_i	bulk density of peat in stratum *I* (g cm^{-3} = tm^{-3})	120	9.4%	Refer to calculation conducted in M2 calculation spread sheet. Based on actual measurements taken in the field and reported in Bulk Density report.
$D_{drain,it}^{logging}$	average depth of peat drainage or average depth of water table in drained area of stratum I, time t during the dry season; cm	108	0%	Assumed maximum methodology default values and demonstrated to be conservative based on field measurements. Uncertainty applied is zero.
$D_{drain,it}^{LLC}$	average depth of peat drainage or average depth of water table in the deforested area under the project scenario in stratum *i*,	124	13.6%	Calculated from field measurements taken prior to blocking of drains.

Parameter	Description	Equation	Uncertainty Rating	Justification
	monitoring year *t*, cm			

The equations used to estimate uncertainty are:

$$Uncertainty_{P,it} \frac{\sqrt{(U_{P,ss1,it} \times E_{P,ss1,it})^2 + (U_{p,ss2,it} \times E_{P,ss2,it})^2 \ldots + \cdots (U_{p,ssn,it} \times E_{P,ssn,it})^2}}{E_{P,ss1,it} + E_{P,ss2,it} \ldots + \cdots E_{P,ssn,it}}$$ VM0004 – 127

Where;

$Uncertainty_{P,it}$ uncertainty in the with-project scenario in stratum i; %

$U_{P,ss,it}$ percentage uncertainty (expressed as 90% confidence interval as a percentage of the mean where appropriate) for carbon stocks, greenhouse gas sources and leakage emissions in the with-project case in stratum I at t (1,2…n represent different carbon pools and/or GHG sources); %

$E_{P,ss,it}$ carbon stock, GHG sources or leakage emissions type (e.g. Trees, down dead wood, soil organic carbon, emissions from fertiliser addition, emissions from biomass burning, emissions from leakage due to activity shifting etc.) in stratum I at time t (1,2,….n represent different carbon pools and/or GHG sources) in the with-project case; tCO_2-e

i = 1,2,3..m_{PS} strata in the project scenario

t = 1,2,3…..t* years elapsed since the start of the project activity

To assess uncertainty across combined strata:

$$Uncertainty_{P,t} = \frac{\sqrt{\sum_{i=1}^{M} (uncertainty_{P,it} \times E_{P,it})^2}}{\sum_{i=1}^{M} E_{P,it}}$$ VM0004 – 128

$$E_{P,it} = C_{P,it} + LK_{AD,it} + LK_{MB,it}$$ VM0004 – 129

Where:

$Uncertainty_{P,t}$ total uncertainty in project scenario in stratum i; %

$Uncertainty_{P,it}$ uncertainty in project in stratum i at time t; %

$E_{P,it}$ sum of carbon stock, GHG sources and leakage emission types in stratum i at time t; t CO_2-e

Calculations to estimate uncertainty are performed in the ex-post monitoring calculation spreadsheet on Tab “Ex-PostUncertainty2013_2014”.

6.4 Leakage

Any activity shifting leakage detected during monitoring of existing or new PT BEST concessions is assessed and reported annually in accordance with the approved monitoring plan. The main steps are outlined below:

1. Existing PT. BEST concessions will be monitored for development and/or expansion
2. Any new PT. BEST concession issued in Indonesia will be monitored
3. Calculations are conducted in accordance with the projects methodology VM0004
4. The area of activity shifting leakage and carbon impact will be assessed and reported at each verification

1. **Existing PT. BEST concessions will be monitored for development and/or expansion**
   It was established at validation that PT BEST was in control of 15 concessions. Twelve (12) of these concessions were converted at the project start date; three (3) were not converted. The three concessions that were not converted were classified as operational[16] (concession 1 in Table 18) and non-operational[17] (concessions 14 and 15 in Table 18). These three concessions were noted as being required for monitoring of activity shifting leakage.

Table 18: PT BEST group oil palm concessions in Indonesia[18]

LABEL	NAME	hectares
1	PT. WANA SAWIT SUBUR LESTARI SK74 north	4,487
2	PT. WANA SAWIT SUBUR LESTARI SK74 south	8,836
3	PT. WANA SAWIT SUBUR LESTARI SK73	7,290
4	PT. WANASAWIT SUBUR LESTARI kucc north	5,708
5	PT. WANASAWIT SUBUR LESTARI kucc south	8,161
6	PT. BANGUN JAYA ALAM PERMAI south	10,824
7	PT. BANGUN JAYA ALAM PERMAI north	11,358
8	PT. BANGUN JAYA ALAM PERMAI east	2,116
9	PT. HAMPARAN MASAWIT BANGUN PERSADA north	4,638
10	PT. HAMPARAN MASAWIT BANGUN PERSADA south	6,642
11	PT. HAMPARAN MASAWIT BANGUN PERSADA east	8,135
12	PT. TUNAS AGRO SUBUR KENCANA north	8,830
13	PT. TUNAS AGRO SUBUR KENCANA south	12,641
14	PT. BERKAH ALAM FAJAR MAS	20,005
15	PT. BAHAUR ERA SAWIT TAMA	19,754
	TOTAL	**139,424**

[16] Operational refers to the concessions status of having completed the concession allocation process and being available for conversion.
[17] Non-operational refers to not having completed all steps required to commence plantation conversion.
[18] This table is taken from the original Project Description documentation. The project annually requests and receives updates to the concession boundaries to ensure they are current for the monitoring year of interest. The area of the concessions can vary from year to year as boundaries are finalised as a result of the concession allocation process and updates to land cover maps which are conducted by the Ministry.

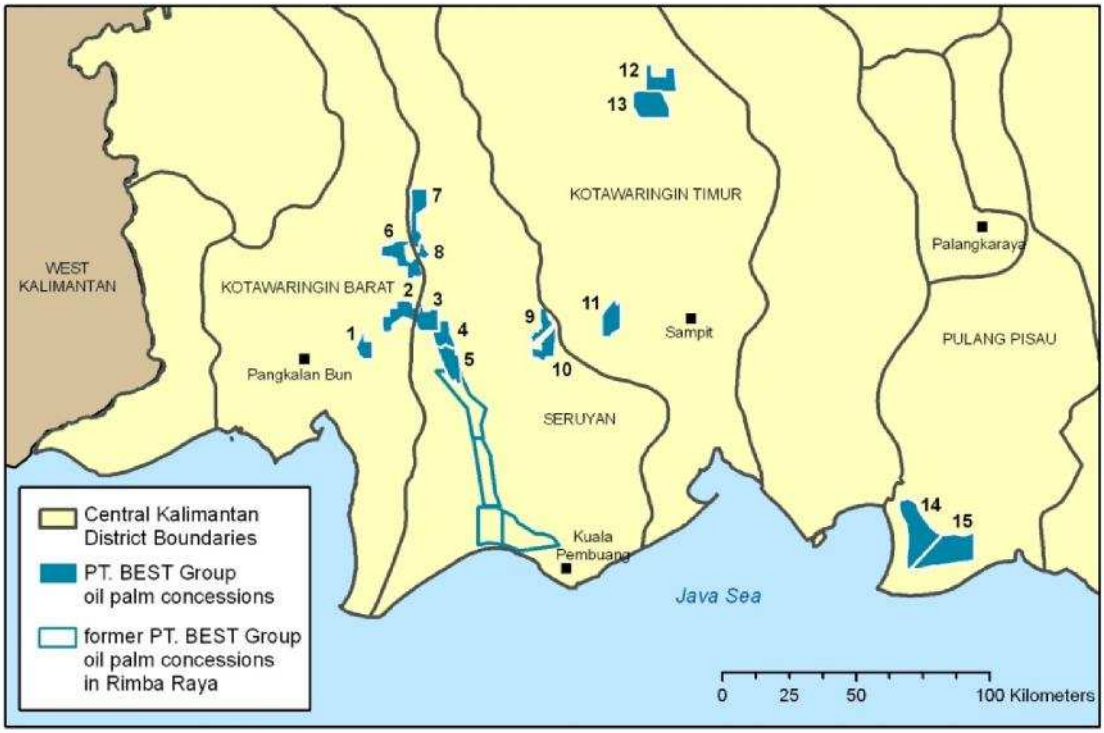

Figure 3: Location of PT BEST concessions in Indonesia

2. Any new PT BEST concessions issued in Indonesia will be monitored

In addition to the three identified concessions to be monitored for activity shifting the leakage the project conducts due diligence to identify any new concessions allocated to the agent of deforestation and its subsidiaries since the project commenced.

The due diligence process undertaken to determine if activity shifting leakage by PT BEST has occurred in the Project defined leakage belt follows a number of steps:

- Obtain the latest spatial file of the concession boundaries (operational and non-operational) from the District or Provincial Forestry Agency.
    - The most recent (i.e. 2014) shape files were provided by the National Forestry Agency and efforts were made to get the same at the Provincial and District levels.
- Determine if any new concessions have been allocated to PT BEST compared with the project start date (i.e. 2009/2010).
    - The operational concession shapefiles were compared in ArcMap and it was confirmed in the attributes table of the operational concessions that no new concessions were allocated to PT BEST, or its known subsidiaries, during the monitoring period[19.]
    - The identified agent of deforestation identified in the baseline was the PT BEST group. This oil palm company controls 15 concessions in 4 districts of Central Kalimantan totaling 139,424 ha, and using the best available information supplied by the District government office this has not changed since the first monitoring period;see **Error! Reference source not found.**. Therefore, based on the information avaialbel to the Project Proponent, no new concessions have been

[19] Shapefiles provided to the verifier as evidence.

alloated to the agent of deforestation and the three concessions identified at the project start date remain as the only concessions monitored for activity shifting leakage.

Table 19: Known status of PT BEST plantations

Indicator	2010 – M1	2012 M2	2013 – M2	2014 – M4
Number of Concessions	15	15	15	15
Total Area under concession	139,424	139,424	139,424	139,424
Number of concessions operational	12	12	12	12

3. Calculations are conducted in accordance with the project methodology VM0004

The overall approach for calculating the area of activity shifting leakage is to first calculate the total area over which deforestation is forecast to occur across all of the land managed by the baseline agent of deforestation in year *t*, including the baseline projected deforestation within the project boundaries. Second, the area of deforestation predicted to occur within the project boundary in year *t* is subtracted from the total area deforested in year *t* across all of the land managed by the baseline agent of deforestation, which yields the expected area of deforestation in year *t* by the focal agent if no leakage had occurred. Third, the difference between the expected area of deforestation in year *t* under the no leakage scenario and the observed area of deforestation over each of the first five years after project implementation results in the area of leaked deforestation.
This approach is numerically conducted through the application (where applicable) of Equations 69-82.
In accordance with the methodology, in cases where activities are displaced to leakage strata that do not exist as baseline strata (e.g., activities are displaced from peat forests to forests on mineral soils), new estimates of average carbon stock changes and GHG emissions will need to be developed (except in the case where activities are displaced to areas with negligible aboveground carbon stocks on mineral soils, in which case *LK*=0).
In leakage strata that are not included as baseline strata (i.e. no timber was to be extracted under the baseline scenario) VB,it = 0, CB,XBT,it = 0, and $LKME,it$ = 0. Additionally soil organic carbon emissions on mineral soil (i.e SOC_{it}) can be defined as zero if activities displaced to leakage stratum *i* involve clearing land for perennial cropland (e.g., oil palm, rubber, etc.).

Carbon stock changes and continued GHG emissions are calculated according to the methodology VM0004, in particular according to Equations 69-70.

$$LK_{Activity\ Displacement} = \sum_{t=1}^{t*} \sum_{i=1}^{M_{LK}} LK_{AD,it} \qquad \text{VM004 - 69}$$

where:

$LK_{ActivityDisplacement}$ = Total GHG emissions due to activity shifting leakage for projects preventing planned deforestation; t CO_2-e

$LK_{AD,it}$ = Total GHG emissions due to activity shifting leakage in stratum i at time t for projects preventing planned deforestation; t CO_2-e

i = 1, 2, 3, ...m_{LK} leakage strata

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

In each stratum, GHG emissions due to activity shifting leakage at time t consist of two components:

1. the initial changes in carbon stocks and GHG emissions that are accounted for in the year of clearing;

   and

2. continued changes in carbon stocks and GHG emissions that occur in subsequent years as a result of peat drainage or clearing land on mineral soils for annual cropland.

$$LK_{AD,it} = \left(LKA_{planned,it} \times \Delta C_{in_{init}}\right) + \sum_{t=1}^{t-1} LKA_{planned,it} \times \Delta C_{it_continued} \qquad \text{VM004 - 70}$$

Where:

$LK_{AD,it}$	= Total GHG emissions due to activity shifting leakage in stratum i at time t for projects preventing planned deforestation; t CO_2-e
$LKA_{planned,it}$,	= The area of activity shifting leakage in stratum i at time t; ha
ΔC_{in_init}	= average initial carbon stock changes and greenhouse gas emissions in stratum i at time t (excluding timber emissions where applicable); t CO_2-e ha^{-1}
$\Delta C_{it_continued}$	= average carbon stock changes and greenhouse gas emissions in stratum i at time t as a result of continued emissions; t CO_2-e ha^{-1}

STEP 1: Determine the baseline area of forest clearance in year *t* for the deforestation agent

Where there is no history of deforestation within a given stratum and no verifiable plans for controlled lands and future-controlled lands by the deforestation agent, then $WoPRi_t$ should be set to the planned baseline rate for the project (Equation 71/72). Within the validated project documents the total area was determined to be 6114 ha[20].

STEP 2: Estimate the new rate of forest clearance by the focal agent of deforestation with project implementation if no leakage is occurring

For each stratum *i* at each time *t*, subtract the area of planned deforestation for within the project area from the historic area of deforestation by the agent of deforestation to calculate the new ―zero leakage‖ area of forest cleared at time *t* (Equation 73).

STEP 3: Monitor all areas deforested by baseline agent of deforestation through the years in which planned deforestation was forecast to occur

The area deforested by the baseline agent within the three identified areas controlled by the agent of deforestation were monitored using LandSAT imagery.The area of activity shifting leakage during the monitoring period (*LKAplanned*,*it*) was calculated in accordance with Equation 74 of the methodology. If $NewRi_t$ exceeds *AdefLK*,*it* (i.e. the area of deforestation under the no leakage scenario exceeds the actual observed rate), then *LKAplanned*,*it* should be set as zero, as positive leakage is not considered under the VCS.

[20] See tab 'Leakage' in the Project calculation spreadsheet for the allocation of this area across strata.

Equations 75-82 of the methodology do not apply this monitoring period as the extraction of timber is covered under the 40% market leakage deduction and in accordance with the methodology prescription relating to conversion of mineral soil to perennial crops such as oil palm, soil organic carbon emissions are zero.

4. **The area of activity shifting leakage and carbon impact will be assessed and reported at each verification**

The area of activity shifting leakage detected I this monitoring period was 211 hectares and the subsequent emissions were calculated to be **58,934 t CO_2-e**, as calculated in the project calcaution spreadsheet for this monitoring period on the tab titled 'Leakage'.

6.5 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

The calculation of project emissions over the monitoring period is performed on the tab "Summary Emissions Table" of the spreadsheet. The net emissions over the monitoring period are summarized in tab titled 'Summary Project Emissions Table'.

6.5.1 Logging ($E_{P,it}^{\log ging}$)

Emissions related to (illegal) timber extraction were estimated to be **83,924 tCO_2-e.**

6.5.2 Fire ($E_{P,it}^{fire}$)

Emissions related to fire were estimated to be **47,401 tCO_2-e.**

6.5.3 Land Use / Land Cover (LU/LC) changes ($E_{P,it}^{LUC}$)

Emissions related to fire were estimated to be **58,274 tCO_2-e.**

6.5.4 Activity Shifting Leakage

Emissions from activity shifting leakage were estimated to be **93,537 tCO_2-e.**

6.5.5 Summary of Carbon Accounting for Monitoring Report 3 (M3)

Actual net greenhouse gas emissions avoided up to and including the third monitoring period (M3) are presented in Table 20 below. The calculations performed to generate the summary tables can be found in the calculation spreadsheet for this monitoring period on the tab titled "SummaryProjectEmissionsTable", row 9, within the calculation spreadsheet.

The buffer allocation was calculated using the VCS AFOLU Non-Permanence Risk Tool V3.2. The calculation of the buffer allocation is conducted on tab titled "SummaryProjectEmissionsTable", column R, within the calculation spreadsheet.

The total net VCUs generated during the Monitoring period covered by this report (i.e. 1 July 2013 – 30 June 2014) are calculated to be:

4,393,291 t CO_2-e

The Risk Buffer allocation is:

672,486 t CO_2-e

The VCUs are presented by year in Table 20 to facilitate reporting of emissions by calendar year as required by the Projects registry.

Table 20: Voluntary Carbon Unit (VCU) Vintages (grey shaded years represent previously issued VCs; white years represent current monitoring period)

Year	Net VCU allocation	Buffer Allocation
2009 (Jul-Dec)	1,090,676	121,186
2010 (Jan-Jun)	1,090,676	121,186
2010 (Jul-Dec)	1,214,561	216,507
2011 (Jan-Jun)	1,214,561	216,507
2011 (Jul-Dec)	1,369,458	246,014
2012 (Jan-Jun)	1,369,458	246,014
2012 (Jul – Dec)	1,666,295	300,569
2013 (Jan-Jun)	1,666,295	300,569
2013 (Jul-Dec)	2,196,646	336,243
2014 (Jan-Jun)	2,196,645	336,243

6.6 Climate Change Adaptation Benefits (GL1)

Four areas of risk due to climate change were identified in the CCB PD. These are:

- **Food security:** In the absence of project activities, drought and fire would be expected to reduce food security. Agricultural productivity would be expected to decline as a direct result of drought-induced water shortage and soil nutrient loss from fire, as well as crop loss due to flooding. Planned activities to mitigate this risk are:
    - Fire suppression, education and training
    - Reforestation/Agro-Forestry-Afforestation
    - Soil enrichment with Biochar
    - Crop diversification, harvest rotation and application of new technologies for improved production
    - Protect and manage large patches of contiguous forest
- **Income:** Communities in the project management zone historically have had limited means of earning cash income with primary dependence on fishing, farming and collecting timber and non-timber resources from local forests This natural resource based economy is especially vulnerable to climate change including the cascading effects from drought and fire that lead to reduced agricultural and fish harvests. Additionally, fire-driven forest loss and damage directly reduce forest-sourced products, further reducing cash income. Planned activities to mitigate this risk are:
    - Fire suppression, education and training
    - Reforestation/Agro-Forestry-Afforestation
    - Crop diversification, harvest rotation and application of new technologies for improved production
    - Aquaponics
    - Soil enrichment with Biochar
    - Protect and manage large patches of contiguous forest
- **Health:** Climate change and associated drought and fire would be expected to have a negative impact on water quality and health in the absence of the project. Peatlands act as water catchment and buffering systems providing water storage and protecting against flooding. Ecosystem damage would negatively impact this ecosystem function. Communities are dependent on the Seruyan River for all their water needs and project activities include improving access to clean drinking water, which is not readily available in Seruyan villages. Drought and flooding, predicted with climate change would be

expected to constrain clean water access and increase the prevalence of water-borne disease in the absence of the project. Increased water temperatures associated with climate change would also be expected to increase the prevalence and toxicity of cholera outbreaks. Planned activities to mitigate this risk are:

- Water conservation, improved irrigation techniques
- Community education and build clinics to provide better access to healthcare

- **Biodiversity:** Climate change, drought and fire would be expected to have independent and compounding negative impacts on biodiversity in the absence of the project. Fire and drought will impact tree mortality, contributing to species extirpation and habitat fragmentation, as well as changing in pattern of fruiting. Shift in fruiting patters may disrupt or change synchronous fruiting unique to Bornean ecosystems with negative consequences on the Project Areas biodiversity. Planned activities to mitigate this risk are:
  - Fire suppression, education and training
  - Reforestation/Agro-Forestry-Afforestation
  - Protect and manage large patches of contiguous forest

Table 21 summarizes suggested activities to minimize, mitigate and /or assist communities and biodiversity adapt to climate change impact that could affect project benefits. It also shows which activities have been implemented already and shows planned activities for the next verification period.

Table 21: Biodiversity Related Activities

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Fire suppression, education and training	Started	Training with BKSDA began in 2010 and will be ongoing. With the hiring of field crews completed in this monitoring period, the main internal training will be conducted in Q2 2015.	May-10	Ongoing		RRC Project Manager
Reforestation/Agro-Forestry-Afforestation	Started	Communities on the northern boundary have agreed to participate in planting activities to rehabilitate the recently disturbed area by the agent of deforestation. One small area in the northern area was planted in 2013 and an additional 60+/- ha was planted in 2014 for the Ulak Batu village. An additional 150 +/- ha was planted in the Central Unit for Muara Dua village.	Aug-13	Ongoing		RRC Project Manager
Water conservation, improved irrigation techniques	Planned	An irrigation system was installed in the Ulak Batu nursery in 2014 and other evaluation of irrigation options were explored in Jahitan and Baung villages.	Aug- 14	Ongoing	Planning and Allocation of funds	RRC Project Manager
Soil enrichment with Biochar	Planned	Nothing has been done to date.	TBD	TBD	Planning and Allocation of funds	RRC Project Manager
Crop diversification, harvest rotation and application of new technologies for improved production	Started	Farmers Field Schools have been held in 6 villages and both Ulak Batu and Muara Dua have established multi-species nurseries for the agro-forestry program in 2014.	May-13	Ongoing	Individual village spatial and economic plans and allocation of funds.	RRC Project Manager
Aquaponics	Planned	One village used their community development stimulus funds for fishing nets, field cages have been established and efforts to improve and market the production of shrimp paste in Sungai Perlu has all been done in 2014.	TBD	TBD	Planning and Allocation of funds	RRC Project Manager
Community education and provide access to clinics to provide better access to healthcare	Started	A health assessment was undertaken by Alam Sehat Lestari in September 2013. This report identified major health issues, root causes of those issues and suggest a plan forward. Only preliminary discussions have begun with the medical community to Indonesia relating to potential staffing of a floating clinic in 2014.	Sep-13	Ongoing	Prioritise suggested actions. Set up a budget and plan to implement actions.	RRC Project Manager

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Protect and manage large patches of contiguous forest	Started	The project has avoided the conversion of approximately 44,263 hectares of peat swamp forest to palm oil. Additionally the Project has completed the demarcation of the ecosystem restoration concession (ERC) boundary which has now be submitted to the Government for the final stage of the ERC licence. This will be the first of its kind in Indonesia.	2009	Ongoing	Annual remote sensing and ground based measurements as described in the monitoring plan. Continual patrols along the ERC boundary demarcation.	RRC Project Manager

7 COMMUNITY

7.1 Net Positive Community Impacts (CM1)

The Rimba Raya project community benefits generated to date represent a net positive benefit for communities. Furthermore, these benefits have been provided in a manner which has maintained one of the most important local assets of the project communities: the natural capital of local forests and the ecosystem services they sustain. These resources remain intact and available for current and future generations. This benefit is in direct contrast to livelihood opportunities that would have been generated through the palm oil conversion, through which the area's natural capital would be eroded and become unavailable over a relatively short period of time.

The Millennium Development Goals (MDGs) are the world's short-term, quantified targets for addressing extreme poverty in its many dimensions – income poverty, hunger, disease, lack of adequate shelter and exclusion – while promoting gender equality, education, and environmental sustainability. They are also basic human rights – the rights of each person on the planet to health, education, shelter, and security. In an effort to create a social buffer for the Project Area and nearby Tanjung Puting National Park, InfiniteEARTH has designed many project activities around targets and success indicators proposed by the MDG program for Indonesia:

Goal 1: Eradicate extreme poverty and hunger

Goal 2: Achieve universal primary education

Goal 3: Promote gender equality and empower women

Goal 4: Reduce child mortality

Goal 5: Improve maternal health

Goal 6: Combat HIV/AIDS, malaria and other diseases

Goal 7: Ensure environmental sustainability

Goal 8: Develop a Global Partnership for Development

As defined in the validated Project Documentation, the approach to demonstrate net community benefits in the Project Area is based on an assessment of 'with' and 'without' project scenarios in relation to these goals. A description of how these goals are addressed in the baseline scenario compared with the project scenario is summarized below. The project progress this monitoring period against these goals is also elaborated further.

BASELINE SCENARIO

Goal 1: Eradicate extreme poverty and hunger

Palm oil is Indonesia's second most successful agricultural product, after rice paddy, and largest agricultural export. It provides a means of income and economic development to a large number Indonesia's rural poor[21]. With over half of Indonesia's population lives in rural areas—of which over 20 percent live below the poverty line—the palm oil industry provides an incomparable means of poverty alleviation (Budidarsono, et al , 2013; Norwana; et al 2011). It allows small landholders to participate in the cash economy and often results in improvements to local infrastructure and greater access to services. In some areas, the cultivation of oil palm has replaced traditional practices, often due to the higher income potential of palm oil (Budidarsono, et al , 2013; Norwana; et al 2011).

However, in some cases, land has been developed by oil palm plantations without consultation or compensation of the indigenous people occupying the land which has led to conflict including in Indonesia. Additionally, some Indonesian oil palm plantations are dependent on imported labor or undocumented immigrants, which has raised concerns about the working conditions and social impacts of these practices[22].

Plantations systematically destroy the rainforest land that the local people depend on, communities are continuously finding themselves with no choice but to become plantation workers. Faced with poor and degrading working conditions, they often earn barely enough income to survive and support their families. Instead of being able to sustain themselves, indigenous communities become reliant on the success of the palm oil industry for their income and survival, leaving these villagers incredibly vulnerable to the world market price of palm oil which they have no control over.

Goal 2: Achieve universal primary education / Goal 4: Reduce child mortality / Goal 5: Improve maternal health

Whilst the development of lands into palm oil plantations can be associated with increases in other services, an Indonesian study has found that access to elementary schools and medical facilities was similar for communities who rely on oil palm compared to communities who don't. In fact distances to schools, hospitals and other medical services were significantly higher in communities relying on oil pam industry compared to those who don't possibly because those communities relying on oil palm are more remote and that public/government facility developments are not prioritized in these remote areas (Budidarsono, et al , 2013) and the oil palm plantations are not filling the gap on these services.

Goal 3: Promote gender equality and empower women

[21] See 'the Economic benefit of Palm oil to Indonesia. A report by World Growth. Available at http://worldgrowth.org/site/wp-content/uploads/2012/06/WG_Indonesian_Palm_Oil_Benefits_Report-2_11.pdf

[22] See Ghosts of our Land. Indonesian oil plam smallholders and the roundtable on sustainable palm oil. Forest Peoples Programme. Available at: http://www.forestpeoples.org/sites/fpp/files/publication/2011/02/ghostsonourownlandtxt06eng.pdf.

Work in oil palm plantations is hard for both men and women, though different. It is quite frequent that women help their husbands in the plantations meet demanding production quotas, usually doing unpaid work. Apart from that, women have to take care of the children, elaborate the food and collect firewood and water, which now are rather far due to destruction of the forest by the oil palm plantations. In case women work on a hired basis, they often receive lower wages than men. Discrimination is set on the grounds that their work is easier than that of men.

According to an article by Rainforest Action Network, women are often assigned tasks that seem less onerous, but which are actually more dangerous and physically demanding than that of their male counterparts. In Indonesia, women are often designated to spray pesticides because it is less physically taxing than other plantation work. Unfortunately, they are rarely given proper protective gear like gloves and masks. When they return home, they have to prepare food for their families, often with pesticide residue still on their skin and clothes[23].

Goal 6: Combat HIV/AIDS, malaria and other diseases

Plants that could help treat or cure diseases such as cancer, AIDS and malaria have been found in the forests of the heart of Borneo but the realization of these plants medical potential is at risk due to wide scale conversion of natural forests to oil palm[24].

According to WWF[25,] 422 new plant species have been discovered in Borneo in the last 25 years, and many other species are waiting to be found and studied, some of them could hold potentially important medical properties. However, these promising discoveries could be eventually lost if the disappearing rainforests of the heart of Borneo are not adequately protected.

Scientists are currently testing samples collected in the Malaysian states of Sabah and Sarawak, as well as in Kalimantan, the Indonesian part of Borneo. They hope to develop drugs that could contribute to the treatment of major, deadly human diseases.

Scientists have found a unique chemical in latex produced by the Bintangor tree which is endemic to Indonesian rainforests. The compound, Calanolide A, appears to be effective against the replication of the Human Immunodeficiency Virus (HIV), as well as the tuberculosis bacterium, which affects many AIDS patients. The discovery is particularly important as, to date, no single drug has been able to treat both HIV and TB. If clinically proven, Calanolide A could be a major development for the health of many millions of people worldwide.

Researchers have also found a powerful and previously unknown anti-malarial agent in the bark of a local tree traditionally used by the Kenyah people of Kalimantan to treat malaria. The substance — a triterpenoid — apparently kills the human malaria parasite Plasmodium falciparum in laboratory tests.

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23 See http://www.ran.org/campaigns/rainforest_agribusiness/resources/fact_sheets/hostile_harvest_us_agribusinesses_and_labor_rights_abuses/

24 See http://news.mongabay.com/2006/0426-wwf.html#6YKqycezKKq4g470.99

25 Biodiscoveries. Borneos Botanical Secret. World Wildlife Fund. Available at: http://wwf.panda.org/about_our_earth/all_publications/?71901/Report-Biodiscoveries-Borneos-Botanical-Secret

The report notes that more forest destruction could well deny science the opportunity to discover and develop further potential sources of life-saving medication.

Goal 7: Ensure environmental sustainability

Although the rapid expansion of the palm oil industry in recent decades has generated considerable economic growth in tropical developing countries, this development has come at high cost to the environment (Fitzherbert et al., 2008; Danielsen et al., 2009).

Millions of hectares of tropical forests have been destroyed to make way for oil palm plantations (Koh et al., 2011), in the process destroying critical habitat for endangered species, including orangutans, tigers, elephants, and rhinos. The serious environmental challenges associated with palm oil production include:

- Biodiversity loss, including loss of rare and endangered species
- Pollution of soil, air, and water
- Soil erosion
- Greenhouse gas (GHG) emissions and climate change
- Loss of key ecosystem services

Deforestation also has significant social implications and can be very damaging for the communities that depend upon these forests for their livelihoods (Colchester, 2011). Serious conflicts can arise when palm oil companies disregard the rights of local communities. Social impacts of palm oil production can include:

- Land grabs
- Loss of livelihoods
- Social conflict
- Forced migration

PROJECT SCEANRIO

The way in which the Project scenario aims to progressively increase the net benefits to the community in the context of the millennium goals is outlined in Figure 5.

Figure 4: Project Scenario Community Activities in Support of Millennium Development Goals

Rimba Raya Collateral Benefits Programs	Meeting and Exceeding United Nations Millennium Development Goals for 2015					
Roll Out Plan	2010	2011	2012	2013	2014	2015
	0%	20%	40%	60%	80%	100%
Construction & operation of Guard & Fire Towers and Orangutan Care Facilities	1 Indicators: #1-5		3 Indicators: #11		7 Indicators: #25-29	
	The construction and ongoing operation of the guard and fire towers and the orangutan care facilities provides substantial employment opportunities to the local community at well above subsistence levels wages. In particular, the orangutan care facilities will be staffed predominantly by women				Community staffed towers and care facilities creates a strong physical and social net around the project area and the adjacent Tanjung Putting Park	
Equal Opportunity Employment at Rimba Raya Reserve	1 Indicators: #1-5		3 Indicators: #11	7 Indicators: #25-29, 32		8 Indicators: #45-48
	Employ at least one member in 50% of all families in the project area by 2015		Target 50% of all employment for women	Create a social and physical barrier around the reserve by linking community welfare with conservation		Make local communities financial stake holders in the success of the project
Fuel-Efficient, Low Emissions, Biomass Cook Stoves, Bio-Char Kilns, & Solar Lighting	4 Indicators: #13-15			7 Indicators: #25-29		
	Indoor air pollution is a significant health hazard, particularly for pregnant women and children and can lead to long-term chronic health issues. The lack of adequate lighting prevents children from reading and studying during non-daylight hours when usually they are engaged in thefamilies horticulturalactivities.			A significant amount of pressure is placed on local forests by rural communities simply from basic fuel source needs for cooking and for light during the12 hour equatorial nights.		

Carbon, Community, & Biodiversity Monitoring	1 Indicators: #1-5	3 Indicators: #11	7 Indicators: #25-32
	Locally staffed monitoring programs provide capacity building and above subsistence level wages	Monitoring jobs are easily filled by women	As the adage goes: "What gets measured, gets managed"
Capacity Building Programs	3 Indicators: #11	7 Indicators: #25-31	8 Indicators: #45-48
	Capacity building programs will provide essential transferable skills, giving the community members, particularly women, viable new employment options	Nearly all of the capacity building programs are centered around conservation awareness and the skills necessary for the implementation of environmental initiatives	- Agriculture: World Education -Orangutan Conservation: OFI -Eco-Tourism: Seminole Indians -Micro-Finance: Yamida or MBK
Annual Grants to OFI, TPNP, Local Universities for Scientific Research	7 Indicators: #25-29		8 Indicators: #45-48
	Funding of grants to local universities and NGOs for scientific research and linking them with outside organizations supports local capacity building and promotes local engagement in the conservation effort. Providing direct funding to the Tanjung Putting National Park Management Authority provides tangible additional protection and therefore significant positive leakage for/from the park (an area four times the size of the project area)		
Community Centers, Libraries & "Early Development" Program & "One Laptop per Child"	2 Indicators: #6-8		
	Make early childhood education and development programs available to every child in all communities within the project zone via learning materials in the community centers and through funding of trained instructors and training programs for instructors from the communities		
Immunization Program	4 Indicators: #13-15		6 Indicators: #21-24
	Fund and promote malaria prevention methods, programs and related equipment to reduce the incidence of child mortality from malaria in the communities by half. Cut the mortality rate from tuberculosis amongst children and adults by half		

Phinisi Floating Clinic	4	Indicators: #13-15	5	Indicators: #16-17	6	Indicators: #21-24	
	Provide mobile Medical & Dental, Emergency medical, professional maternity care including birthing, and minor surgery to the communities along the Seruyan River						
Micro-Finance	1	Indicators: #1-5	3	Indicators: #11	7	Indicators: #25-32	8 Indicators: #45-48
	A portion of the revenue share with the local communities will be delivered through our micro-finance program. As with most micro-finance programs, ours will focus on women as the primary beneficiary group, funding programs such as the seedling/sapling greenhouse nurseries, small scale eco-tourism (home stays), poultry and small scale low impact aquaculture projects, etc. InfiniteEARTH will subcontract the administration of these programs to Yamida or MBK						
Restoration Project through Community Based Agro-Forestry & Aquaponics	1	Indicators: #1-5	7	Indicators: #25-29	8	Indicators: #45-48	
	Achieve restoration and reforestation goals through integrated natural forest re-growth with community based cash crop, multi-story mixed agro-forestry and low-impact aquaculture programs that alleviate hunger, poverty and pressures on the surrounding primary and secondary forests. Execute in cooperation and participation of the palm oil concessionaires (as JV partners) in order to address leakage risk.						
Community-Based Eco-Tourism	1	Indicators: #1-5	3	Indicators: #11	7	Indicators: #25-29	8 Indicators: #45-48
	Create a "sister city" (sister village) type program with the Seminole Indian communities in the Florida Everglades who have a long and successful history of community based eco-tourism based on indigenous cultures and swamp forests. From this collaboration and knowledge transfer, create a community based eco-tourism business for the communities in the project area through micro-financing program and through potential JVs with intl. groups						

CURRENT MONITORING YEAR

During the current monitoring period work with the communities consisted of engagement, planning and implementation across the following targeted areas:

Construction and operation of Guard & Fire Towers and Orangutan Care Facilities

Equal Opportunity Employment at Rimba Raya Reserve

Fuel-Efficient, Low Emissions, Biomass Cook Stoves, Bio-Char Kilns, & Solar Lighting

Carbon, Community, & Biodiversity Monitoring

Capacity Building Programs

Annual Grants to OFI, TPNP, Local Universities for Scientific Research

Community Centers, Libraries & "Early Development" Program & "One Laptop per Child

Micro- finance

Restoration Project through community based agro-forestry and aquaponics

Indicators and monitoring results with respect to the effectiveness of community-related activities are based on the activities, outputs, outcomes and impacts for each community-related project activity area. The results are presented below in Table 22.

Table 22 Summary of community activities

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Employment opportunities through construction & operation of guard & fire towers	Started	Negotiations on location of guard post in the northern boundary of the PA are in an advanced stage. Work has commenced on establishing optimum location of future guard posts in the southern project area. Until the survey of the boundary has been approved and signed by the Ministry of Forestry these guard and fire towers locations cannot be finalized and built. All the field work on the survey is completed and now in the review and approval process.	NA	June-15	Create a map of location for further guard posts and set up budget requirements. Get final approval and signature of Ministry of Forestry so plan can be implemented in the field.	RRC Project Manager
Employment opportunities through Orangutan Care Facilities	Started	A new Orangutan release center location has been identified.	Aug-13	Ongoing	Allocate funds, identify staff, organise materials.	OFI Project Manager
Employment opportunities through Monitoring activities	Started	The project has focused on utilising local communities for services, such as hiring speed boats and providing logistical support in the field. 23 of 33 permanent field staff from the villages have been hired with an additional 10 to occur in January 2015 and an additional 33 seasonal at the end of the rainy season. Additionally 2 community development staff from each village will be hired to implement and monitor community development programs within their respective villages.	2009	Ongoing	As the projects proposed activities gain momentum a more structured employment plan will evolve. Increase sales of credits or other funding sources to continue implementing and hiring necessary staff.	RRC Project Manager
Employment of women in project related employment	Started	The project has focused on utilising local communities for services, such as hiring speed boats and providing logistical support in the field. Initial efforts in recruiting provided no applications from women so additional effort will be made to recruit women during hiring of community development staff for each village. Two additional women were hired in the Sampit office to increase the numbers of women working in the project to 3.	2010	Ongoing	As the projects proposed activities gain momentum a more structured employment plan will evolve.	RRC Project Manager

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Supply of fuel-efficient, low emissions, biomass cook stoves	Started	100 Unit of water filters for drinking and 100 cooking stoves have been provided by Kopernick. 725 water filters have been provided to the villagers in 6 villages. All stoves have been provided but have not been totally accepted yet by the community so are looking into the option of collaborating with government on a gas stove distribution program and working with a natural gas company CSR program to develop and build a gas distribution center in the area to provide the gas to villagers.	Aug-13	Dec-15	Identify areas with high demand for these units. Distribute units to identified areas. Teach communities how to use correctly.	RRC Project Manager
Supply of Solar Lighting	Started	Introduce and distribute solar powered lights and charging facilities Pricing and various options for this are in the process of being evaluated for implementation including a LED individual home lighting system powered by 12V battery.	May-10	Ongoing	Plan to reintroduce additional lights in 2014	RRC Project Manager
Community based agro-forestry	Started	Communities on the northern boundary have agreed to participate in planting activities to rehabilitate the recently disturbed area by the agent of deforestation. Tree nurseries have been established in Muara Dua and Ulak Batu with a total of 160,000+/- seedlings of multiple species purchased for 2014 planting season.	Aug-13	Ongoing	Once the water levels receed during the dry season, planting will commence.	RRC Project Manager
Build community centers in strategically selected villages inside the Project Zone.	Planned	Two community centers have been built using Community Development Stimulus Funds in Ulak Batu and Palingkau.	Dec-13	Ongoing	Receipt and allocation of funding, finish planning	WE and RRC Project Management
Extend World Education's ongoing programs for food security, access to government services, and capacity building within the project zone	Planned	Forestry Field Schools and Fishery Field Schools have been conducted in 8 of the 10 villages. More focus will apply once spatial planning and individual community development plans have been developed in cooperation with each village.	13-Dec	Ongoing	Receipt and allocation of funding, finish planning	WE and RRC Project Management

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Micro Credit will be provided. Project proponents will partner with certain organizations to provide: 1) funding for all individuals in the Rimba Raya Project Zone; 2) budget support for field agents to work in the area; 3) supplementary budget support as needed and justified; and 4) support for training of field agents dedicated to the region.	Planned	Potential national banks have been discussed who may be interested in collaborating and managing this program but no decisions made to date.	Jun-14	Ongoing	Finalizing the choice of partner then begin micorcredit project	RRC Project Manager
Sustainable Health Care. Program. IE plans to develop a health care system designed specifically to meet the needs of Project Zone communities in collaboration with Health in Harmony (HIH), The IE health care program framework will comprise three steps: 1. Assess the health care needs of Project Zone communities; 2. Develop a system that best suits their unique needs; and 3. Evaluate the program regularly to improve, adapt, and evolve as we learn more and needs change.	Started	A health assessment was undertaken by Alam Sehat Lestari in September 2013. This report identified major health issues, root causes of those issues and suggest a plan forward. No further development.	Sep-13	Ongoing	Prioritise suggested actions. Set up a budget and plan to implement actions.	RRC Project Manager

7.2 Negative Offsite Stakeholder impacts (CM2)

Following possible negative impacts were initially identified:

- Threat to subsistence livelihoods: Although the project proponent aims to safeguard the forest against the incursion of palm oil plantations, there has not been a restriction of traditional modes of hunting and small scale timber removal. The project proponent recognizes the economic and cultural value of such activities, and does not seek to restrain them. In fact, restrictions are largely unnecessary, as hunting and small scale extraction from the forest are not significant contributors to local economies.

  Evidence collected during the ground survey indicates that local communities still use the area for subsistence livelihood. Evidence of selective extraction for canoes and housing was found as well as collection of jelutung (rubber), for sale. Also expansion of subsistence gardens on degraded lands is evident.

  Planting for this year has focused on species needed for wood construction as well as other income producing species and planted in the buffer area where limited extraction will not impact the carbon accounting area.

- Hunting: Social surveys indicated that hunting is limited to deer which can be found in and around the Project Area. Meat protein is largely acquired through fishing in the Seruyan River and Project Area and poultry raising in villages.

  Recent investigation indicates that a significant portion of the fires within the concession area are purposely set to establish green grass areas to attract the deer and make it easier to hunt them. One option being evaluated to deal with this is wildlife “farming”, particularly for deer, so that the villagers will have venison until the forest and deer population are restored to normal levels.

  The Project has not restricted fishing inside the Project Area. At regular intervals within the wetland water courses fishing huts are found and there is evidence that these are continually used.

- Employment: Palm companies’ preference for hiring outside labour thereby limits opportunities for Project Zone communities to benefit from palm employment. The opportunity costs associated with palm employment will thus not have a large impact on Project Zone communities.

  To date the Project has directly employed 23 villagers as permanent full time staff, will hire another 20 permanent full time staff in Q1 of 2015 and an additional 33 seasonal staff in Q2 2015.

7.3 Exceptional Community Benefits (GL2)

None of the planned project activities will have a negative impact on HCVs in the Project Zone. Project activities are heavily focused on maintaining and enhancing forests and natural ecosystems, and thus the environmental, social, and cultural benefits derived from them. Such activities will have a strong positive impact on HCVs 4-6. Table 23 below summarizes key threats to HCVs and recommended project activities to address threats within the framework of the project and also identifies activities that have already been undertaken and others that are planned for the future.

The project collected preliminary socio-economic data during the PDD development and we continue to collect this data to determine effectiveness of our programs. One of the major stated objectives of our programs is benefit the poorest people of the community the most and this data (a) allows us to identify by family who these are, and (b) focus or tailor efforts to ensure they are a major beneficiary of the results of our programs. Additionally, women in Indonesia are known to primarily be located in the poorest quartile of citizens and our programs are focused on improving their lives through employment opportunities (non-field and hard labor related) as well as specific programs such as the handicrafts made from recycled plastic in Telaga Pulang.

Table 23 High Conservation Values for Communities

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Prevent further oil palm expansion; maintain and enhance remaining forests in the Project Zone; possibly rehabilitate select riparian forest zones; prevent spread of forest fires, specially into peat areas with direct impact on water quality of the Seruyan	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil since the project start. This is a significant achievement given the pressure from two sides by the driver of deforestation.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Protect all remaining forests (esp. natural forests) and wetlands from periodic fire; prevent further conversion to industrial scale agriculture, which increases fire risk; reduce possible deliberate use of fire for renewal of shallow water fishing grounds through education and awareness campaigns	Started	The project acknowledges that preventing fire is challenging, and has subsequently identified the location of posts and engagement and training of fire guards is urgent.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management
Water: Prevention of further oil palm expansion; education and outreach to create viable safer alternative for public sanitation; prevention of further conversion and loss of riparian forests, as well as possible rehabilitation of key riparian zones.	Started	Water quality has been maintained through prevention of further oil palm conversion and rehabilitation of disturbed areas in particular in the northern boundary.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management
Fisheries: same as for water above, plus planned efforts to explore potential for facilitating communities to organize and establish a fisheries cooperative, local rules and management regulations, and associated local enforcement bodies.	Not commenced	TBD	2014	Ongoing	Planning and Allocation of funds	RRC Project Manager
Building materials: Prevention of forest loss by oil palm expansion and possible development of local bodies to manage local timber harvesting levels to promote chances for long-term sustainable supplies.	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil. Timber production species are being selected and planted as part of the rehabilitation programme.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Fuel wood: prevention of large-scale natural vegetation clearance for oil palm.	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management
Prevention of forest loss by oil palm expansion and possible development of local bodies to manage communal forest areas in a more structured fashion to promote chances for long-term sustainability of forest areas.	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil. The first partnership planting between Rimba Raya Conservation and the communities has commenced in the northern boundaries.	Jul-09	Ongoing	The project will continue to patrol and protect the boundaries and plans to increase the intensity particularly in the high risk areas.	RRC Management
Buffer Planting Program	Started	Seedlings being planted within the concession boundary are purchased from village nurseries that are supported by individuals and families who provide the labour to grow the seedlings. This purchase price is distributed according to the effort and seedlings grown by individuals and families. Once the seedlings are purchased, the villagers plant them on their dedicated plot of land, typically 1 ha, but left up to the village to determine. These villagers then reap the benefits of the products from that plant of land for their personal and family income, food or wood for construction. A major target of this activity is the poor families within the villages.	Oct 2013	Ongoing	Completing the baseline for each community to ensure that the most poor families have been adequately identified to ensure village government provides them the first opportunity for improvement.	RRC Project Manager

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Women Capacity Building	Started	Typically in rural villages in Indonesia the poorest communities members with the least capacity are the women. A pilot project of Farmer Field School focusing on vegetables and only women was conducted to improve their capacity and knowledge and allow them to contribute with fresh vegetables for their family and community should they wish to sell.	June 2013	Ongoing	Completing the baseline for each community to ensure that the most poor families have been adequately identified to ensure village government provides them the first opportunity for improvement. Monitoring the effectiveness of the program to ensure that it provided the benefits sought in the objectives.	RRC Project Manager

8 BIODIVERSITY

8.1 Net Positive Biodiversity Impacts (B1)

The net biodiversity benefit for the Project Zone over the project lifetime is positive. The 'without project' scenario equates to conversion of most or all remaining forests in the Project Area to oil palm plantations, currently the greatest threat to biodiversity in the Project Zone. A sharp decline in the biodiversity of the Project Zone through direct negative impacts of land clearing and associated indirect impacts (e.g., providing access to more remote forests for hunting, illegal logging and the draining of peat swamp forest) would be the result. Additionally, this would have allowed greater access to Tanjung Putting National Park with no buffer which would result in a significant impact on the park biodiversity and threaten the OFI program for orangutan release within the park. Through the establishment of the Rimba Raya project, these negative impacts have been avoided and the project therefore has net positive biodiversity impacts.

Activities implemented or planned are summarised in Table 24 below.

Since the Project started the Project has directly and indirectly contributed to the net positive biodiversity impact in the areas.

Directly the project has provided financial support to OFI to continue with its work to rehabilitate and release orangutan back into the forest.

Indirectly the Project has avoided the conversion of 44,263 hectares of peat swamp forest compared with the baseline scenario. This forest represents a significant habit that will be extremely important to the ongoing protection of the orang-utans in the future.

Over the next couple of years the Project will establish a release centre in the Project Area and will continue to monitor and protect the boundaries of the Project from the agents of deforestation and the impacts of fire.

Table 24. Biodiversity Implementation and Results

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Maintain and enhance forests in the project zone to avoid disconnection of HCV1.1 forests from the Project Area	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Management
Allow selective logging for local consumption, but protect all remaining forests	Started	The project has not overtly restricted logging, however OFI and Rimba Raya staff regularly patrol the area to discourage this and the monitoring of key access areas captures any disturbance, which is accounted for.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Management
Protection of the Seruyan and its tributaries through stabilizing land use and potentially replanting some areas to restore riparian zone and flood plain buffers. Education program for local communities.	Started	Planting has commenced in the northern buffer zone. Additionally planting has commenced in the Central area to restore fire areas, protect the tatah that the villagers use for fish and access.	Jul-09	Ongoing	Set up of education programmes	RRC Management
Protecting all remaining forests (esp. natural forests) and wetlands; prevent further conversion to industrial scale agriculture; reducing hunting through education and awareness campaigns	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil. Hunter education has started in the Forest Field School at the junior high and high school levels.	Jul-09	Ongoing	Community awareness programmes have commenced to support this aim.	RRC Management
Lakes & water bodies: Education and protection of important bird areas	Started	The project has avoided conversion of 44,263 ha into palm oil which has resulted in allowing the lakes and water bodies to remain intact.	Jul-09	Ongoing	Community awareness programmes have commenced to support this aim.	RRC Project management
Grassy banks & slow moving rivers: Education and protection of areas important to birds for nesting or foraging	Started	The project has avoided conversion of 44,263 hectares into palm oil which has resulted in allowing the lakes and water bodies to remain in tact	Jul-09	Ongoing	Community awareness programmes have commenced to support this aim.	RRC Project management

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Ecozones: Protection of forest and wetland ecozones from any disturbance	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Management
Potential to enhance landscape level forest connectivity (in turn restoring this HCV) by preventing further isolation of remaining fragments and reconnecting large remnant patches of forest	Started	The project has completed the boundary demarcation and is in the final stage of formalising the Ecosystem Restoration Licence.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Management
Protecting wetlands and forests where ecozones exist	Started	The project has avoided conversion of 44,263 hectares into palm oil which has resulted in protecting wetlands and forests where ecozones exist.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Project management
Protecting wetlands and forests; reduce hunting	Started	The project has avoided conversion of 44,263 ha into palm oil which has resulted in protecting wetlands and forests.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Project management
Not to clear forest in HCV 3 areas	Started	The project has avoided the conversion of 44,263 hectares of peat swamp forest to palm oil.	Jul-09	Ongoing	Ongoing patrols and monitoring as per monitoring plan	RRC Management

8.2 Negative Offsite Biodiversity Impacts (B2)

To gauge off-site impacts to biodiversity that may be caused by the project, project proponents have been monitoring the movements and business activities of oil palm companies that will retire their licenses in the Project Area as a result of project activities.

The project will also document the political economic dimensions of illegal logging activities in the Project Zone (e.g., where loggers originate, who is funding the illegal logging) and report the activity to appropriate authorities. Alternative job opportunities will be sought for local residents involved in the illegal logging through community development initiatives. The project will also attempt to track where illegal logging operations relocate, in an effort to monitor off-site impacts to biodiversity.

It should be noted, finally, that any potential off-site negative impacts to biodiversity will be more than offset by the projects role as a physical buffer to TPNP and the protection that the project will offer to the park's biodiversity.

Table 25 below summarizes activities proposed and status of implementation.

Table 25. Negative Offsite Biodiversity Impacts

Activities	Status	Implementation details	Start date	Finish date	Steps necessary to start/finish activity	Responsibility
Monitoring of business activities of oil palm companies that have retired their licenses in the PA	Started	The project has monitored and reported activities of the agent of deforestation in the leakage buffer zone	Jul-09	Ongoing	Annual remote sensing as described in the monitoring plan	RRC Project Manager
Document economic dimensions of illegal logging activities and report to appropriate authorities	Started	The project has monitored and reported activities of any illegal logging identified in the Carbon Accounting area and buffer zone	Aug-13	Ongoing	Annual remote sensing and ground based measurements as described in the monitoring plan	RRC Project Manager
Provide alternative job opportunities	Started	The project contracts local people to provide transportation and logistical support for field work. It is anticipated that the services will be extended to planting and building once the project activities evolve. Additionally, 23 permanent personnel have been hired from the villages for patrol, surveys, firefighting and other field activities with an additional 10 to be hire Q1 2015 and 33 seasonal to be hired in Q2 2015..	Jul-09	Ongoing	Once the project activities gain momentum, more job opportunities will become available for local communities	RRC Project Manager
Track location of illegal logging operations	Started	annual monitoring indicated no illegal activities within the PA	Aug-13	Ongoing	annual remote sensing and ground based measurements as described in the monitoring plan	RRC Project Manager

8.3 Exceptional Biodiversity Benefits (GL3)

A total of 54 species listed as *Critically Endangered* or *Endangered* by IUCN are likely present in the Rimba Raya Project Area, 17 of which are confirmed present in TPNP. An additional 40 species listed as *Vulnerable* by IUCN are likely present in the Project Area, 13 of which are confirmed in TNTP. Conservation of the Project Area has protected these species. Field surveys of species present in the Project Area are ongoing to monitor presence and absence and in some cases abundance of some of these species.

Table 26: Critically Endangered or Endangered Species within the Project Area

Estimated Total and Confirmed Number of Endangered, Threatened & Vulnerable Species Found in Project Area		
	CR & EN Species	**VU Species**
	Total (confirmed)	**Total (confirmed)**
Mammal	8 (6)	21 (12)
Bird	1 (1)	8 (6)
Plant	39 (7)	6 (1)
Reptile	6 (3)	5 (0)
Total	54 (17)	40 (19)

Table 27: Critically Endangered and Endangered Species Lists

Endangered & Critically Endangered Species Found in Project Area		
Mammals		
Catopuma badia	Borneo bay cat	EN
Hylobates albibarbis	Bornean agile gibbon	EN
Lutra sumatrana	Hairy-nosed otter	EN
Manis javanica	Sunda pangolin	EN
Nasalis larvatus	Proboscis monkey	EN
Pongo pygmaeus	Bornean orangutan	EN
Birds		
Ciconia stormi	Storm's Stork	EN
Plants		
Dipterocarpus coriaceus		CR
Shorea balangeran		CR
Shorea platycarpa		CR
Shorea quiso		CR
Shorea leprosula		EN
Shorea teysmaniana		EN
Vatica mangapchoi		EN
Reptiles		
Tomistoma schlegelii	False ghavial	EN
Orlitia borneensis	Malayan giant turtle	EN
Manouria emys	Asian giant tortoise	EN

Table 28: Vulnerable Species

Vulnerable Species Found in Project Area	
Mammals	
Arctictis binturong	Binturong (bearcat)
Helarctos malayanus	Sun bear
Hipposideros ridleyi	Ridley's roundleaf bat
Macaca nemestrina	Pig-tailed macaque
Megaerops wetmorei	White collared fruit bat
Murina aenea	Bronzed tube nosed bat
Murina rozendaali	Gilded tube nosed bat
Neofelis diardi	Sunda clouded leopard
Nycticebus menagensis	Bornean slow loris
Rusa unicolor	Sambar deer
Sus barbatus	Bearded pig
Tarsius bancanus	Sunda tarsier
Birds	
Leptoptilos javanicus	Lesser Adjutant
Treron capellei	Large Green Pigeon
Lophura erythrophthalma	Crestless Fireback
Melanoperdix nigra	Black Partridge
Pitta baudii	Blue-headed Pitta
Setornis criniger	Hook-billed Bulbul
Plants	
Gonystylus bancanus	

9 ADDITIONAL INFORMATION

9.1 Records and Information

In accordance with VCS requirements all documents and records are kept in a secure and retrievable manner. The project proponent is committed to the storage of data for at least two years after the end of the project crediting period.

The electronic and hard copy data sources are stored in the locations described in Table 29.

Table 29: Data and Information Storage Locations

Data / Information	Location 1	Location 2	Location 3
Project design documents/plans/procedures	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**Environmental Accounting Services (EAS)** 50 Charles Court, Lake Hawea, Wanaka RD2, 9382New Zealand	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia
Satellite images	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia	**Remote Sensing Solutions (RSS)** Isarstr. 3 82065 Baierbrunn, Munich
Land Use Land cover change files	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia	**Remote Sensing Solutions (RSS)** Isarstr. 3 82065 Baierbrunn, Munich
Hard copies of field patrols	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**Rimba Raya Field Office** Jl .Nangka II No.62 RT/RW : 08/02 Kel. Ketapang, Kec. Mentawa Baru Hulu Sampit – Kalimantan Tengah	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia
Carbon and biodiversity related Field Patrol Reports	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**Rimba Raya Field Office** Jl .Nangka II No.62 RT/RW : 08/02 Kel. Ketapang, Kec. Mentawa Baru Hulu Sampit – Kalimantan Tengah	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia
Community engagement field data	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun	**World Education** World Education Jalan Tebet Dalam IV-D Number 5A Jakarta 12810 Indonesia	**Rimba Raya Field Office** Jl .Nangka II No.62 RT/RW : 08/02 Kel. Ketapang, Kec.

Data / Information	Location 1	Location 2	Location 3
	Kalimantan Tengah 74111, Indonesia		Mentawa Baru Hulu Sampit – Kalimantan Tengah
Community Engagement Summary Reports	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**World Education** World Education Jalan Tebet Dalam IV-D Number 5A Jakarta 12810 Indonesia	**Rimba Raya Field Office** Jl .Nangka II No.62 RT/RW : 08/02 Kel. Ketapang, Kec. Mentawa Baru Hulu Sampit – Kalimantan Tengah
Monitoring reports and calculations	**Orangutan Foundation International (OFI)** Jalan Hasanuddin No. 10 Blk DKD Pangkalan Bun Kalimantan Tengah 74111, Indonesia	**PT Pandu Maha Wana** Asia Pacific Consulting Solutions Jl. Veteran, Gg Jempinis No.17, Banjar Uma Kepuh, Desa Buduk. Mengwi, Badung 80351 Bali - Indonesia	**Environmental Accounting Services (EAS)** 50 Charles Court, Lake Hawea, Wanaka RD2, 9382,New Zealand

9.2 Quality Assurance and Quality Control

An internal Quality Control (QC) and Quality Assurance (QA) process has been developed and followed. The detailed procedures are outlined in the 'QA_QC ProcessV1.2'. A brief summary of the QA/QC procedures are described below.

9.2.1 Field measurement procedures and field data collection

To verify that plots have been installed and the measurements taken correctly, 10-20% of plots shall be randomly selected and re-measured independently. Key re-measurement elements include the location of plots, DBH and tree height. The re-measurement data shall be compared with the original measurement data. Any deviation between measurement and re-measurement below 5% will be considered tolerable and error above 5%. Any errors found shall be corrected and recorded. All errors discovered should be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

9.2.2 Remote sensing

Remotely sensed data was collected and processed in accordance with the QA/AC procedures described in the GOFC-GOLD Sourcebook (GOFC-GOLD, 2010). Accuracy assessments of land cover change detected in the monitoring period are carried out consistent with the GOFC-GOLD Sourcebook. A confusion matrix describing the errors of omission and commission was the developed. This procedure will continue to be followed for each image captured and classified as part of the monitoring program. The Project is working with an independent consultant (RSS) who are very experienced in remote sensing techniques in peat swamp forests of Kalimantan.

RSS continue to assist the project to enhance its remote sensing Standard Operating Procedures (SOP). The Project SOP which describes RSS processing process is titled

SOPLandCoverChange_LandCoverChangeAnalysis_External.docx. The documentation of the current land use / land cover analysis and change detection will assist in consistent reporting of project activities between monitoring periods. .

9.2.3 Data entry and analysis

Reliable estimation of carbon stock in pools requires proper entry of data into the data analyses spreadsheets. To minimize the possible errors in this process, the entry of both field data and laboratory data shall be reviewed using expert judgment and, where necessary, comparison with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analyzing data should be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

9.2.4 Data storage

Due to the long-term nature of the Rimba Raya project activity, data shall be archived and maintained safely. Data archiving shall take both electronic and paper forms, and copies of all data shall be provided to each project participant. All electronic data and reports shall also be copied on durable media such as CDs and copies of the CDs are stored in multiple locations.

The archives shall include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- Estimates of the carbon stock changes in all pools and non-CO2 GHG and corresponding calculation spreadsheets;
- GIS products (including all aerial imagery if applicable);
- Copies of the measuring and monitoring reports.
- The current storage locations of all these files are listed in Section 6 of this monitoring Report.

10 REFERENCES

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11 APPENDIX 1 – IMAGES USED IN LAND USE LAND COVER ANALYSIS

Satellite	Path/ Row	Acquisition date
2010		
Landsat-5	119/062	2010-01-16
2012		
Landsat-7	119/062	2012-06-06
Landsat-7	119/062	2012-05-05
Landsat-7	119/062	2012-10-12
Landsat-7	119/062	2012-09-10
Landsat-7	119/062	2011-11-11
2013		
Landsat-7	119/062	2013-08-12
Landsat-8	119/062	2013-06-01
Landsat-8	119/062	2013-04-30
Landsat-8	119/062	2013-07-03
Landsat-7	119/062	2013-06-25
2014		
Landsat-8	119/062	2014-08-23
Landsat-8	119/062	2014-07-22
Landsat-8	119/062	2014-09-24
Landsat-7	119/062	2014-06-12