New Planting Procedure - Summary of Assessments

RSPO Roundtable on Sustainable Palm Oil	Bumitama Agri Ltd.	mutu international

NPP Reference Number:	[this should be the same as the notification statement]
Country of the NPP submission:	Indonesia
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Section 1: General Information

PT Tanah Tani Lestari (TTL) which is in Sub-district of Telaga Antang, Antang Kalang and Tualan Hulu, District of Kotawaringin Timur, Central Kalimantan Province, is a palm oil company that is a member of the RSPO under its parent company Bumitama Agri Ltd. In its plantation operations, PT TTL has a plantation business permit (Izin Usaha Perkebunan, IUP) and has carried out the Environmental Impact Assessment (EIA/ AMDAL) which has been approved by the government.

PT TTL has plans to develop land for oil palm, with the focus areas for new plantings based on Plantation Business Permit No. 188.45/81/Huk-Ek.SDA/2013 which was approved on 31 January 2013 for an area of ± 6,771.38 ha and No. 12/DPMPTSP/IUP/VI/2021 which was approved on 7 June 2021 for an area of 2473.14 ha. Along the process, PT TTL will adopt the RSPO NPP guideline 2021. As a part of the process, PT TTL has carried out the integrated HCV-HCS Assessment which also has been stated satisfactory by HCVRN Quality Panel Review, Soil and Topography Study, Land Use Changes Analysis (LUCA), Social Environment Impact Assessment (SEIA/ SIA), Green House Gas (GHG) calculator through the alternatives of land clearance and carry out socialization to the surrounding community by applying the principle of FPIC.

The results of each assessment will be displayed in this NPP summary of assessments report.

Company Information and Contact Person

Company Name	:	PT Tanah Tani Lestari
Company Address	:	Jalan Melawai Raya No. 10, South Jakarta Jakarta- Indonesia, 12160
Type of business	:	Oil Palm Plantation & Mill
Capital Status	:	Foreign Investment (*Penanaman Modal Asing, PMA*)
Geographical Location		1°30'43.22" - 1°53'19.97"S
		112°33'25.22" - 112°42'34.68" E
		See Map 1 and Map 2

Surrounding Entities

North	:	Plantation area of PT Bangkit Giat Usaha Mandiri
South	:	Rubber Plantation (INHUTANI)
West	:	Plantation area of PT Unggul Lestari & PT Buana Aditama
East	:	Plantation area of PT Karya Makmur Bahagia & PT Uni Primacom

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Table 1. Types of permits and recommendations PT TTL

| No.	Licenses and Recommendations	Issued by	Number & Date	Note
1	Deed of Establishment	- Tintin Surtini, SH. MH. Mkn - Muhammat Hatta, SH (Last Change)	- No: 51 dated 29-06-2007 - No: 19 dated on 11-06-2014	
2	Approval of the deed of Establishment	Ministry of Justice & Human Rights	W7-09469 HT.01.01-TH.2007 dated 28-08-2007	
3	Approval of the deed of Establishment Changes	Ministry of Justice & Human Rights	AHU-16033.40.22.2014 dated 26-06-2014	
4	Taxpayer Notification Number	Tax Service Office	02.596.844.7-064.000 Dated 23-09-2013	
5	Permitted Area (Izin Lokasi)	District of Kotawaringin Timur	1114.400.9.62.02/IX/2012 Dated 07-09-2012	± 11,127 Ha
6	Document of Environmental Management & Monitoring (EIA/ UKL- UPL)	District of Kotawaringin Timur	- 188.45/682/Huk-BLH/2013 dated 09-01-2013	- 2,448 ha
			- 188.45/683/Huk-BLH/2013 dated 10-01-2013	- 2,424 ha
			- 188.45/684/Huk-BLH/2013 dated 14-01-2013	- 1,899 ha
			- 660/405/DLH-EK.SDA/V/2018 (For Convertible Forest Areas)	- 2,477 ha
7	Plantation Permit (IUP)	District of Kotawaringin Timur	- 188.45/81/Huk-Ek.SDA/2013 dated 31-01-2013	6,771.38 ha Mill: 45MT/Hr
			- 12/DPMPTSP/IUP/VI/2021 dated: 7 June 2021	2,473.14 ha
8	Clearance Permits for Convertible Forest Areas	District of Kotawaringin Timur	4/1/PKH/PMA/2017 dated 30-01-2017	2,477 ha
9	Land Right Tittle	National Land Agency	59/HGU/KEM-ATR/BPN/2016 dated 27-09-2016	4,283.95 ha

Area and time-plan for new plantings

The proposed new planting area by PT TTL is in the Plantation Permit (Izin Usaha Perkebunan, IUP), which has been agreed by the owners of the land that it will be made available to the company through the FPIC (free, prior and informed consent). Land development and planting of oil palm will begin by following the procedures of the RSPO New Planting Procedures (NPP), using NPP Guidelines 2021.

Table 2. New Planting Projection Plan PT TTL			
Description		**Area**	
		ha	**%**
A **Developed Area**		**3,791.88**	**41%**
Oil Palm	3,620.69		
Infrastructure	171.19		
B **Conservation Area**		**1,609.73**	**17%**
HCV	230.91		
HCS	44.00		
HCV Part of HCS	1,334.83		
C **Community Oil Palm**		**2,281.67**	**25%**
D **Settlement** (Pemukiman)		**60.15**	**1%**
E **Area Proposed for New Planting**		**1,473.61**	**16%**
2023	630.41		
2024	843.20		
Total Area (A+B+C+D+E)		**9,217.04**	**100%**

Section 2: Maps
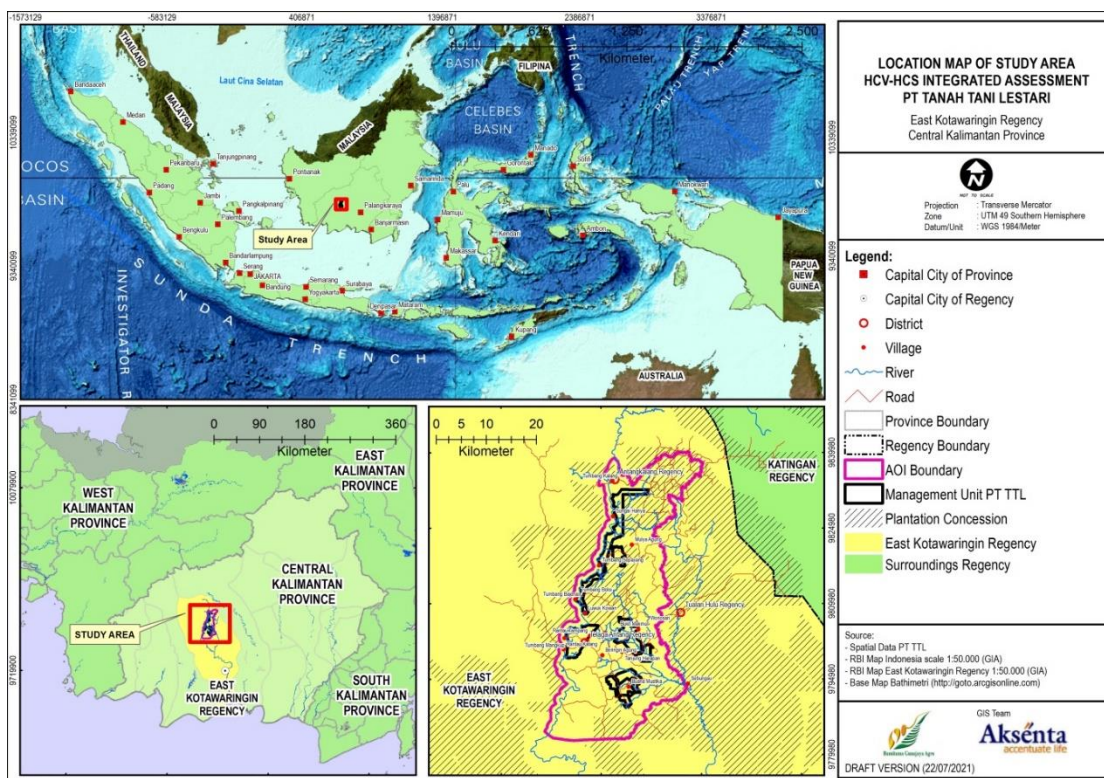
Map 1. The Location of PT TTL in Sub-district of Telaga Antang, Antang Kalang & Tualan Hulu, District of Kotawaringin Timur, Central Kalimantan Province
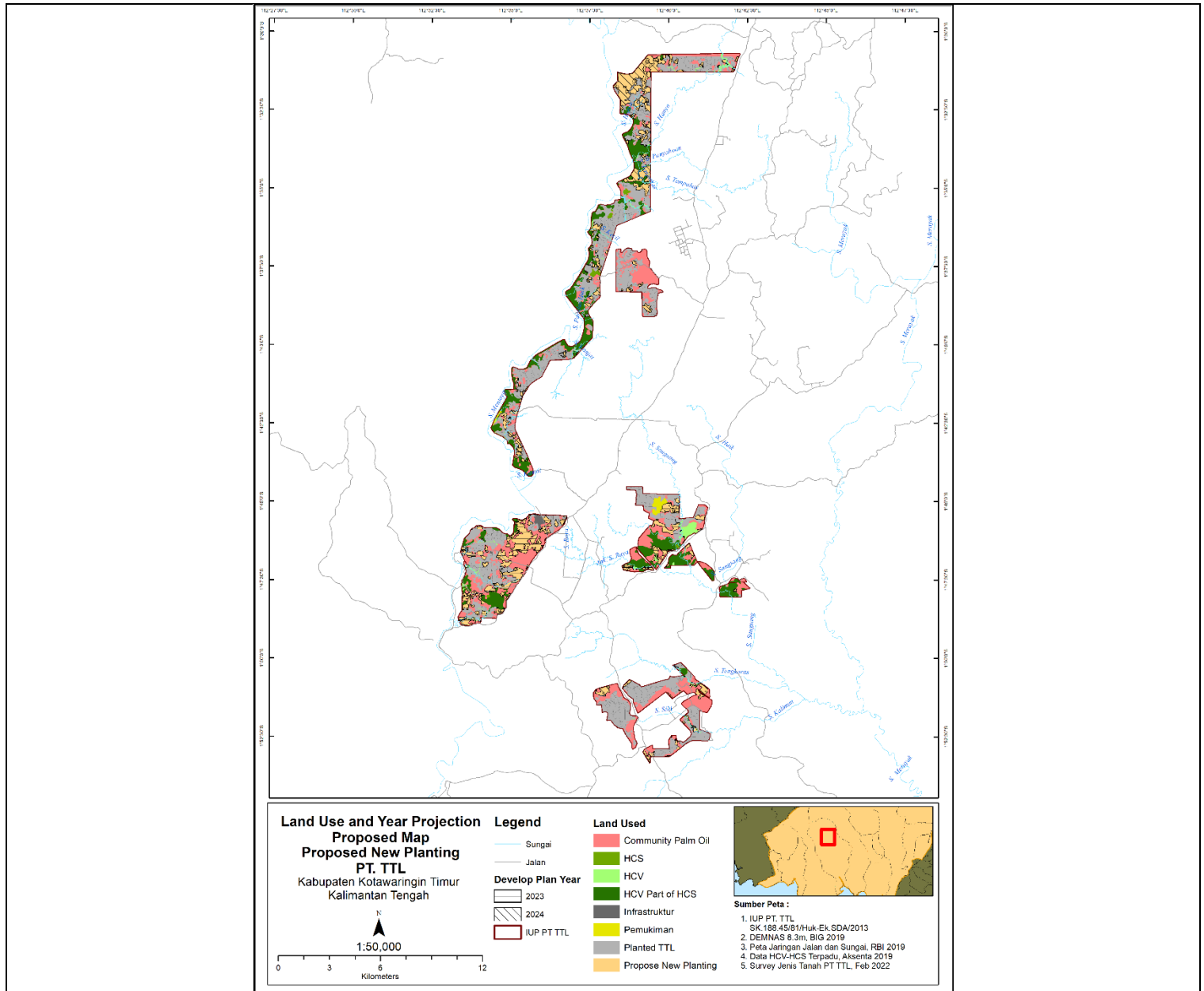
Map 2. Indicative Conservation Land Use Plan of PT TTL and Area Proposed for New Planting

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Section 3: SEIA

Environmental Impact Assessment (EIA)

The Environmental Management and Environmental Monitoring Effort Document (UKL – UPL) of PT TTL was carried out by the management of PT TTL on 8 October 2013 and 13 November 2017. The Environmental Management and Environmental Monitoring Effort Document (UKL – UPL) has been approved by Regent of Kotawaringin Timur according to the letter number 188.45/683/Huk-BLH/2013, dated 10 January 2013 for the area of 6,771 ha and letter number 4/1/PKH/PMA/2017, dated 30 January 2017 for an additional area of 2,477 ha.

Assessment Methods

The Environmental Management and Environmental Monitoring Effort Document has been prepared in accordance with the prevailing laws and regulations of the Indonesian government. The data collection process was strongly associated with the type of data that were collected. Generally, studies will be conducted based on primary data and secondary data. Primary

data were obtained through observation, measurement and field interviews, and secondary data were obtained from the literature collected, either from the company, or directly from related institutions in the study of this area. The methods that were used to collect the data were adjusted with the components that can be studied. The data must be accurate and reliable so that it could be used to analyze, measure, and observe the environmental components which were predicted to be affected and components of action plan which were predicted to give significant impacts to the surrounding environment. The collected data were as follow:

- Physic – Chemist Components (Climate, Air Quality and Hydrology, and Soil).

- Biological Components (Vegetation, Animals, and Water Biota).

- Socio-Economic Culture Components (Demography/ Population, Social, Economic, Social and Cultural).

- Environmental Health and Public Health Components (Environmental sanitation, public health level, level of public health services).

a. Methods of Significant Impact Estimation

Determination of the significant impact to the environment caused by the development activities of the plantation and the palm oil mill is only intended as an attempt to estimate the large and important environmental quality changes that are caused by the plantation development activities and the palm oil mills of PT TTL in Subdistrict of Antang Kalang, Telaga Antang and Tualan Hulu, District of Kotawaringin Timur. The method of significant impact estimation is by differentiating the magnitude of impact and significance of impact.

b. Estimation of the Magnitude of Impact

Magnitude of impact is measured from the environmental quality changes. The estimation of the magnitude of impact is done by either formal or non-formal methods.

i) Formal Methods

Formal methods are used to estimate the impact of parameters whose system characteristics can be identified or estimated by environmental threshold approach at national and regional levels.

ii) Non-Formal Methods

Non-formal method is based on experts' professional judgment, logical frame analysis and analogy. This method is used to estimate the environmental parameters whose system characteristics are difficult to identify or estimate by modeling approach such as models, socio-cultural systems.

To simplify the estimation of the magnitude of impact, the approach of environmental quality assessment scale is used in matrix filling. This scale is ranged from 1-5. Based on this assessment, environmental quality is differentiated as: excellent (5), good (4), fairly good (3), bad (2), and very poor (1).

c. Determination of Significant Impact Characteristics

The assessment of the significant impact characteristics was in accordance with BAPEDAL decision Number: KEP-056 of 1994 on Guidelines Regarding Significant Impacts size. Meanwhile regarding the impact evaluation, significant impacts are classified into two categories: important and less important. Characteristics of impact are divided into two groups, negative impacts and positive impacts. It will be regarded as negative if the changes/impact estimated gets adverse towards the environment, and it is positive if the changes/ impact estimated gives benefit to the environment.

d. Methods of Significant Impact Evaluation

The significant impact evaluation explore "holistic causative" against expected environmental components that are affected. Thus, interaction matrix is used as a supporting tool. Interaction matrix between activity components and environmental components contains magnitude of impact and significance of impact. This significant impact evaluation

will conduct careful and thorough study to the primary impacts (positive / negative) and secondary impacts (positive / negative), and other derivative impacts on the environmental and activity components.

The study of the important source of impact and hypothetical impact can identify the key issue that needs to be managed. The results of the important impact evaluation are also expected to assist the decision-making process in the selection of a viable alternative plan that considers environmental aspects of the proposed area.

Summary of Assessment Findings

The development of oil palm plantation and palm oil mill of PT TTL in Sub-district of Antang Kalang, Telaga Antang and Tualan Hulu, District of Kotawaringin Timur raises the awareness of the environmental impact on the physical-chemical, biological, and social, economic, cultural, and local public health, both positive and negative impacts. In the implementation of plantation development and palm oil mill of PT TTL, one of the main considerations is the preservation of the environment, to ensure sustainable development.

The EIA study of the plantation's activity and palm oil mill is a single EIA activity/ project. The scoping study of the area boundary for Environmental Impact Assessment (EIA) of Oil Palm Plantation activities considers four (4) factors, namely: limited project/ activity, ecological boundaries, social boundaries, and administrative boundaries.

Plantation activities and palm oil mill were predicted to impact the environment, thus it needs to be explored in depth including the four phases of activities: Pre-Construction Phase, Construction Phase, Operational Phase and Post-Operational Phase.

a. Pre-construction Phase

    At this phase, there may be a change in attitudes and perceptions and containing social unrest, due to the socialization and boundary demarcation, also land acquisition.

b. Construction Phase

    The identified activities that will be carried on this phase could be the mobilization of heavy equipment, manpower recruitment, land clearing, construction of facilities and infrastructure, seeding and planting, maintenance of immature plants, factory construction and wastewater treatment plant, construction of water channels and roads. Those activities will have impacts as follows; decrease in air and water surface quality, increase in noise level, land & forest fire potential, decrease in the diversity of flora and fauna species, and change in attitudes and perceptions as well as the decrease in public health. The positive impacts include; increase in job and business opportunities and increase in people's income.

c. Operational Phase

    At this phase the identified activities could be nursery, FFB harvesting and transport, mobilization of heavy equipment and maintenance of oil palm trees. The magnitude and significance of impact that need attention at the operational phase are the decrease of air quality and increase in noise level, increase in job and business opportunities, increase incomes, change in attitudes and perceptions, decrease in public health in the study area.

d. Post-Operational Phase

    There will be labor dismissals, demobilization of heavy equipment, reforestation, and revegetation, and land handover to government and community which will have significant impacts; decrease in air quality, increase in noise level, decrease in local income, change in attitudes and perceptions, and community unrest.

Changes in some aspects of the environment (abiotic, biotic, social, economic, cultural, and public health) due to these activities in Sub-district of Antang Kalang, Telaga Antang and Tualan Hulu, District of Kotawaringin Timur, require a further efficiency in the utilization of available natural resources, optimizing the management, and monitoring efforts which needed to be integrated into all components of the integrated business.

The magnitude and significance of impacts that will be managed and monitored in the Environmental Management Plan and Environmental Monitoring Plan based on the results of the impact evaluation are: 1) Physical-chemical environment

components including air quality, surface water quality, and forest fires potential; 2) Social culture and public health components including social unrest, job and business opportunities, perceptions, local income, and public health level.

Environmental management of the environmental components that are experiencing fundamental changes, both positive and negative as an effect of the oil palm development plan of PT TTL will be carried out in three approaches: technological, socio-economic-cultural and institutional.

The implementation of environmental monitoring is carried out by PT TTL. The environmental monitoring reports will be submitted annually to the technical adviser of the government agencies.

Social Impact Assessment (SIA)

The latest Social Impact Assessment of PT Tanah Tani Lestari was carried by Internal Team of Bumitama in September – October 2022. This assessment was reviewed by independent external experts. The team is as follows:

Table 3. SIA Team Member and Expertise in PT Tanah Tani Lestari

No.	Name	Agency	Position	Expertise
1	Rudi Wakiatno	Bumitama Gunajaya Agro	CSR Coordinator Central Kalimantan Region	Coordinator of planning, implementation, and evaluation of CSR programmes and other social aspects in BGA operations in Central Kalimantan
2	Kalista Khairunnisa	Bumitama Gunajaya Agro	CSR Officer	Assistant of of CSR programmes and other social aspects in BGA
3	Khairul Amri	PT TTL	CSR Assistant	Field executor of CSR programmes and external relation for PT TTL's sustainability programmes
4	Rendy Marshel Muhaling	PT TTL	CSR Assistant	Field executor of CSR programmes and external relation for PT TTL's sustainability programmes
5	Chandra Bayu Widodo	PT TTL	Sustainability Assistant	Field executor of CSR programmes and external relation for PT TTL's sustainability programmes
6	Agam Fatchurrochman	Bumitama Gunajaya Agro	Deputy CS & CSR	Head of Certification and CSR at BGA
7	Nandang Mulyana	Independent Consultant	Reviewer	Community engagement, Social Impact Assessment, HCV Social, dan FPIC

Methodology

The latest Social Impact Assessment of PT Tanah Tani Lestari was compiled using a comparative method by comparing social dynamics in 2018 with the latest social Impact assessment. This method used the literature approach while data collection was obtained from the village's premier survey with Direct Observation method on the social conditions of the local community and FGDs with related villages where the determination of respondents was done by proposive sampling.

Table 4. Source of secondary data and information for the Social Impact Assessment

No	Source
1	*Social Impact Assessment* (SIA) di areal PT Tanah Tani Lestari (AKSENTA, 2018)
2	Kecamatan Antang Kalang Dalam Angka, 2021
3	Kecamatan Telaga Antang Dalam Angka, 2021
4	Kecamatan Tualan Hulu Dalam Angka, 2021
5	Report Program CSR PT Tanah Tani Lestari, 2019

| 6 | Report Program CSR PT Tanah Tani Lestari, 2020 | |
| 7 | Report Program CSR PT Tanah Tani Lestari, 2021 | |

Table 5. Scope of the social impact assessment

No	Sub-district	Village	SIA 2022
1	Antang Kalang	Sungai Hanya	✓
2	Antang Kalang	Mulya Agung	✓
3	Antang Kalang	Tumbang Sepayang	✓
4	Telaga Antang	Tumbang Boloi	✓
5	Telaga Antang	Tumbang Bajenei	✓
6	Telaga Antang	Luwuk Kuwan	✓
7	Telaga Antang	Rantau Tampang	✓
8	Telaga Antang	Tumbang Mangkup	✓
9	Telaga Antang	Rantau Katang	✓
10	Telaga Antang	Buana Mustika	✓
11	Telaga Antang	Tanjung Harapan	✓
12	Tualan Hulu	Bukit Makmur	✓
13	Tualan Hulu	Sebungsu	✓

Characteristics of the Surrounding Communities

PT TTL is administratively in 3 sub-districts, Antang Kalang, Telaga Antang and Tualan Hulu. Antang Kalang Subdistrict covers an area of 1,579 km^2, Telaga Antang Subdistrict covers an area 1,456.21 km^2 and Tualan Hulu Subdistrict covers an area 1,090.85 km^2. From Central Statistic Department (Badan Pusat Statisk, BPS) data for 2021, the number of people in 13 villages around PT TTL is 34,578.

Table 6. Village demographics around PT TTL

No.	Name of Villages	Population		
		Male	Female	Total
	Subdistrict of Antang Kalang			
1	Tumbang Sepayang	578	546	1124
2	Sungai Hanya	422	373	795
3	Mulya Agung	673	616	1289
	Subdistrict of Telaga Antang			
4	Rantau Katang	511	470	981
5	Tumbang Boloi	334	273	607
6	Tumbang Bajenei	135	116	251
7	Lluwuk Kuwan	175	175	350
8	Rantau Tampang	345	312	657
9	Tumbang Mangkup	286	242	528
10	Buana Mustika	1020	896	1916
11	Tanjung Harapan	1148	1117	2265
	Subdistrict of Tualan Hulu			
12	Bukit Makmur	481	404	885
13	Sebungsu	351	329	680

Source: Antang Kalang in Numbers, 2021; Telaga Antang in Numbers, 2021; Tualan Hulu in Numbers, 2021

In general, the local villages that became the working area of the company are along the watershed, namely Mentaya River, Hanya River, Raya River and several small rivers that flow in those villages. The ethnicity in the villages around PT TTL area varies according to the village typology. The majority ethnic in the native villages is Dayak, while the majority ethnic at the transmigrant villages are Javanese (from East Java and Central Java) and Sundanese (from West Java).

Socio-Economic

In general, the villagers' primary livelihood around oil palm plantations is doing business or working as farmers and rubber tappers. With the existence of oil palm plantations, many of the local people get involved as workers. Some of them also have or develop their own oil palm plantations without engaging or participating in the partnership scheme implemented by the company.

Other activities which are also often carried out by local people who live in a riverside, especially in Tempahas River is fishing in seasonally. Fishing is mostly just for personal consumption. The type of fish caught is typical endemic fish species in the area such as, Tomang, Baung, and Tempahas.

Meanwhile, today's primary livelihood of the trans-village residents is freelance laborer or worker in oil palm plantations. Before the existence of oil palm plantations, they also involved in timber transporting from illegal logging or became construction workers in the district capital.

Educational facilities

Educational facilities and infrastructures in the villages surrounding PT TTL area are already available, starting from kindergarten to high school level. Kindergarten and elementary schools are available in almost all villages, while junior and senior high schools are provided in certain villages to serve several surrounding villages.

To get high school education services, some children have to live in boarding houses around the school, because the distance is too far so that it is not possible to travel back and forth. Another alternative to get education services equivalent to high school is to the vocational school (SMK) built by PT KMB, which is close to the company.

Table 7. Educational Facilities in Villages around PT TTL

No.	Village/ Sub-district	Kindergarten	Elementary School	Junior High School	Senior High School
	Antang Kalang				
1	Tumbang Sepayang	2	2	1	-
2	Sungai Hanya	-	1	-	-
3	Mulya Agung	1	1	-	-
	Telaga Antang				
4	Tumbang Boloi	1	1	1	-
5	Tumbang Bajenei	-	1	-	-
6	Luwuk Kowan	-	1	-	-
7	Rantau Tampang	1	1	-	-
8	Tumbang Mangkup	1	1	-	-
9	Buana Mustika	1	1	1	-
10	Tanjunng Harapan	2	2	1	-
11	Rantau Katang	1	1	-	1
	Tualan Hulu				
12	Bukit Makmur	1	1	-	-
13	Sebungsu	2	2	-	-

Source: Antang Kalang in Numbers, 2021; Telaga Antang in Numbers, 2021; Tualan Hulu in Numbers, 2021

Infrastructure

Transportation facilities and infrastructures in villages around PT TTL area are generally inadequate. Roads as transportation infrastructure are still mostly dirt roads with some already hardened, thus when it rains, they are slippery and difficult to pass, especially by two-wheeled vehicles, as a common vehicle. Likewise, regular public transportation facilities are not yet available, but there is shuttle transportation for trips to Sampit or Palangkaraya.

The accessibility of local peoples to the economic centres in the district is inseparable from the role of palm oil companies who built roads. Before land access can be reached, in general, local peoples use the river path to reach the centres of economic activity in the district.

Health And Clean Water Facilities

Public health services available in the villages surrounding PT TTL area are Pustu and Posyandu, while some other villages, besides having a Pustu, also have a Poskesdes or Polindes.

Table 8. Healthcare Facilities in Villages around PT TTL

No.	Village/ Sub-district	Puskesmas	Pustu	Poskesdes	Polindes	Posyandu
	Antang Kalang					
1	Tumbang Sepayang	-	-	-	1	1
2	Sungai Hanya	-	-	-	1	1
3	Mulya Agung	-	-	-	1	1
	Telaga Antang					
4	Tumbang Boloi	-	1	-	-	1
5	Tumbang Bajenei	-	-	-	-	1
6	Luwuk Kowan	-	1	-	-	-
7	Rantau Tampang	-	1	1	-	1
8	Tumbang Mangkup	-	-	1	-	-
9	Buana Mustika	-	1	1	-	1
10	Tanjunng Harapan	-	1	1	-	1
11	Rantau Katang	-	-	-	1	1
	Tualan Hulu					
12	Bukit Makmur	-	1	-	1	1
13	Sebungsu	-	-	-	1	1

Source: Antang Kalang in Numbers, 2021; Telaga Antang in Numbers, 2021; Tualan Hulu in Numbers, 2021

Meanwhile, to meet the needs of clean water, residents rely on pump wells, dug wells, and river/lake bodies. The use of river bodies as a source of drinking water is considered to be increasingly risky.

Internal Issues, Impacts, and Potential Impacts and Social Risks

Internal Social Issues

General social conditions related to current company policies:

1. In terms of management system and company policies implemented, in general the company has provided comfort for employees and their families
2. The wages earned by employees already meet the district's regional minimum wage standards
3. Employee housing is quite good with bathing, washing, latrine (sanitation) facilities, bedrooms, kitchens, terraces, and living rooms that are integrated with the family room. The emplacement is also equipped with facilities for houses of worship and childcare. Electricity is available from 03:30 – 05:00 am and 05:00 – 10:00 pm . This is in

accordance with Article 100 of Law No. 13 of 2003 concerning the provision of welfare facilities, including childcare. Childcare is related to the efforts to ensure children's health, including ensuring healthy food.

4. Employees have received health insurance in the form of the Company's contribution in the payment of national health insurance (BPJS), this also includes work accident insurance and pension insurance. PT TTL's health services are carried out by clinics managed by its sister company. The clinics provide temporary inpatient care, but for more intensive care employees must go to Sampit or Palangkaraya. The health personnel/medical team in the clinics are doctors, midwives, and nurses.

5. The implementation of Occupational Health and Safety (OHS) has generally been carried out according to standards. Employees have had the convenience of obtaining Personal Protective Equipment (PPE) because all types of PPE are provided by the Company. If damage occurs, the employee may immediately apply for a replacement. However, the company needs to increase the spirit and implementation of the OHS policy.

Table 9. The dynamics of internal social issues related to PT TTL's activities

Source of Impact	Issue/ Potential Issue
Management cooperation with the sister company (PT KMB)	The community and workers do not know the boundaries of the operational area between the two companies and in which company they are employed. This ambiguity has the potential to cause anxiety for recruited employees, because it is related to the Company's responsibilities to the employees and surrounding community. This also creates potential impacts related to public doubts about the company's operations, plasma partnership programs and other community development programmes.
Plantation operational related to the usage of chemical materials	The possibility of pollution and chemical exposure to family members, since there are employees who go straight home after working with chemicals.

External Issues, Impacts, and Potential Impacts and Social Risks

External Social Issues

Table 10. The dynamics of social issues related to the activities of PT TTL
and outside the Company

Source of Impact	Past Issues	Updated condition from the latest SIA
Communication, social relations, and partnership	Due to a management contract with its sister company, and socialization activities carried out by those sister company, less people(s) knew about PT TTL.	More people(s) know of the existence of PT TTL. Recently, PT TTL has done more often socialization related to its operations, especially partnership patterns, increasing land rights and CSR programmes.
Plantation Management	- There was a transfer of ownership of community oil palm plants managed by the Company (Plasma estate) to peoples from outside the village. - Economic inequality and causes expressions of dissatisfaction, which are addressed to the Company.	- People realized that the transfer of plasma ownership happened by the agreement between the parties, could occur due to economic needs, and the company did not decide on this.
Employee Recruitment	There has been a decrease in the interest of villagers to become employees, because they	Community representatives, who participated in the Focus Group Discussion

	choose to manage their own oil palm plantations.	informed that most local people have a relatively low level of education (on average elementary school graduates), they also do not have good skills and knowledge in carrying out agricultural cultivation and/or other business activities.
Construction of infrastructure	The community is allowed to pass through the plantation's road for easier access, but the road quality is not good. When it rains it is difficult to pass.	The government has built more state roads, however, many village/inter-village & sub-district roads are still damaged. The company helps with road repairs and access according to capabilities and priorities.
Land acquisition (tenurial)	Communities tend to hold onto the land they control, to make their own oil palm plantation.	The community said that there is still potential land for oil palm plantation. Most people want to use that land for their own oil palm; however, they realize they often constrained by financial capital for land clearance.
Harvesting	The theft of oil palm fruit is quite massive.	The theft of oil palm bunches is still a big problem. Peoples, especially farmers who own oil palm plantations, are increasingly restive, theft causes loss of sales volume of FFB owned by farmers.

External Positive Social Issue

- The presence of the company increases public awareness in better oil palm cultivation, one of which is through the sale of certified oil palm seeds on credit without interest. Peoples realize that the use of quality seeds will give good results, even without intensive care. With far less fertilizer than the Company's standards, the quantity and quality of the fruit produced is quite adequate.
- The formation of cooperatives and the involvement of citizens in these institutions are positive things in terms of social capital. Modern economic institutions are considered as an innovation for citizens. The cooperatives that were formed in the villages surrounding PT TTL area are fostered and under the guidance of the Company and participate in the management of the oil palm plantation until the distribution of the results.
- The use of abandoned land increased after receiving GRTT payments and income from the development of community gardens managed by the Company. The availability of cash encourages residents to invest in oil palm plantations and other business fields.
- One of the positive impacts of PT TTL's plantations is the construction of plantation's roads, which at the same time opens access for residents to travel to other villages or to their land. The existence of these roads makes it easier for the community to build gardens and transport the produce to be marketed.
- Citizens' access to credit from financial institutions (banks) has increased with the development of community gardens.

Table 11. Social Risk from the Issues and Negative Impact

Issues and Negative Impact	Potential of Social Risk
Internal Social Risk	
PT TTL is bound by a management contract with PT KMB, its sister company, so that the surrounding community is less able to distinguish between PT KMB's operations and TTL's.	- The emergence of negative perceptions from the community regarding the management of social conditions - There is an opportunity for the mass media to exaggerate the problem

PT TTL is considered necessary to improve work facilities, especially for work related to chemical applications	- Can be a source of pollution at home - The effects of poison are more extensive and cause poisoning to employees
External Social Risk	
Because PT TTL has a management contract with PT KMB, PT TTL is not well known by the public	Communities have a negative perception against the company
There was a transfer of ownership of the plasma plantation to outside peoples	Social conflict related to plasma partnership & SHK
Decrease in interest of villagers to become employees, because they chose to manage their own oil palm plantations. The villagers who work in companies do not fully have good competence.	Companies must bring in labour from outside, but an increase in number of external workers will also increase the risk of native jealousy.
The plantation road, which is also the access road for the community, is difficult to pass when it rains.	Demands to provide better & wider road access
The occurrence of palm fruit theft	Companies need more supervision systems and personnel
Social interaction and social cohesiveness decrease because peoples were busy to work in PT TTL and their own plantation	Triggering jealousy and unfair competition that threaten the community and the Company at the same time.
The availability of land reserves and ownership decrease by the operational of PT TTL	In one planting period a large workforce will grow in the sub-districts located in the PT TTL area, which requires employment, so it will become a pressure on the Company.
The availability of clean water decreases by the potential for river pollution from the use of pesticides and waste disposal	Increasing of decent living wage, the company will be required to assist in providing clean water sources

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Section 4: HCV-HCSA Assessment; OR

ALS HCV and Standalone HCSA assessment

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4.1. Assessor and Credential

The HCV-HCS integrated assessment conducted in the Permitted Area (Izin Lokasi) of PT TTL was carried by Gagas Dinamiga Aksenta (Aksenta), which located at Jln. Gandaria VIII/10 Kebayoran Baru, Jakarta - Indonesia 12130. Webpage www.aksenta.com

This HCV document had been reviewed by the HCVRN and was declared satisfactory on 15 December 2021, please refer to the following link:
https://www.hcvnetwork.org/reports/laporan-penilaian-high-conservation-value-high-carbon-stock-approach-terpadu-pt-tanah-tani-lestari-kabupaten-kotawaringin-timur-provinsi-kalimantan-tengah

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Table 12. Key consultants of HCV-HCSA Integrated Assessment

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Name	Role	Expertise
Idung Risdiyanto	Team Assessor (ALS15029IR)	Hydrology, forest ecology, spatial modelling, carbon stock, land suitability,

Name	Role	Expertise
		peat survey, watershed management also soil and water conservation
Bias Berlio Pradyatama (Scoping study team member)	GIS and Remote Sensing (ALS19001BP)	Land cover carbon assessment, High Carbon Stock Approach Assessment, HCS Patch Analysis
Tedi Setiadi (Scoping study team member)	Environmental Assessment Coordinator	Bird, Mammals & landscape ecology
T. Ade Pahlevi (Scoping study team member)	Social Assessment Coordinator	Socio-economic, stakeholder & community engagement
Reza Abdillah (Scoping study team member)	GIS and Remote Sensing	GIS, remotes sensing & landscape biophysical analysis
Yanto Ardiyanto	Wetland ecosystem services and peat	Hydrologist, soil and ecosystem services
Arif Hilman	PM & FGD Facilitator	Community engagement
Adhy W. Setiawan	Biodiversity survey	Bird, Mammals and Plant taxonomy
Rahmat Darmawan	Biodiversity survey	Plant taxonomy
Noor Rahmat	PM & FGD Facilitator	Community engagement

Table 13. Structure of the Forest Inventory Team

Name	Role	Expertise
M. Fakhrul (Aksenta)	Forest Inventory Coordinator	GIS, remote sensing & Carbon Stock Assessment
Priyo Dwi Utomo (Aksenta)	Team member	GIS, remote sensing & Carbon Stock Assessment
Anwar Muzakkir (Aksenta)	Team member	Plant taxonomy & Carbon Stock Assessment
Nurani Hardikananda (Aksenta)	Team member	Plant taxonomy & Carbon Stock Assessment
Gunawan (PT TTL)	Team member, local assistant	Surveyor
Yadi (PT TTL)	Team member, local assistant	Surveyor
Jotoh (Local people)	Team member, local assistant	Surveyor
Mudi (Local people)	Team member, local assistant	Surveyor
Bowo (PT TTL)	Team member, local assistant	Surveyor

4.2. Assessment Timeline

The assessment activity series are carried out from March 2019 to January 2020. Phases of the activity refers to HCV-HCSA Assessment Manual (HCVRN, 2017).

Table 14. Phases and timeline of the Integrated HCV-HCSA Assessment

Phase	Activity	Location	Timeline
Pre-Assessment	• Free Prior and Informed Consent (FPIC)	Jakarta	05 – 30 March 2019

		• Basic information collection • Kick-off meeting • Due diligence • Contract Signing		
Scoping Study	• Desktop study (non-field work); secondary data/ information collection and analysis • Stakeholder identification	Jakarta	01 – 30 April 2019	
	Initial stakeholder consultation (NGO, government)	Palangkaraya & Sampit	06 – 07 May 2019	
	• Site visit for land cover verification • Consultation with local community representatives • FPIC	PT TTL	06 – 12 May 2019	
Full-Assessment	Site visit for: social assessment, participatory mapping, environmental assessment, biodiversity assessment and carbon assessment	PT TTL	15 – 25 June 2019	
	Analysis & interpretation	Jakarta	01 July – 08 August 2019	
	• Final Consultation	PT KMB	17 September 0219	
		Sampit	18 September 2019	
	• Report preparation	Jakarta	30 September 2019 -15 January 2020	

Other studies relating to the Assessment, that have been performed by the Company includes Environmental Management and Monitoring Activities (UKL/UPL) (in 2012 for TTL 1, and in 2013 for TTL 2 and 3), as well as Social Impact Assessment (2018). These studies are used as the source of supporting data and information for this Assessment. As a matter of fact, the MU has not conducted Land Tenure and Land Use Study. Therefore, based on Advice Note 2 document, it is recommended to carry out these studies upon the Assessment.

4.3. Pre-Assessment

Pre-assessment is an activity to obtain initial information necessary in an assessment. Information in this phase is collected through discussion and coordination through physical meetings, emails and by phone. This phase also includes meetings between the Assessment team and Bumitama Agri, Ltd./PT TTL. These meetings serve as a coordination concerning the Company situations and background and involves exchange of information concerning the Assessment objectives and process, as well as requirements, costs (including the Assessment and ALS quality control fees), conditions to meet to proceed with the Assessment process, and necessary data and information in the entire course of this Assessment.

Table 15. Due diligence against four preconditions

No.	Preconditions	Due Diligence
1.	Commitment to environmental and social conservation	As part of BGA, PT TTL is committed to sustainability as expressed in its sustainability policy that includes four aspects: forest conservation and sustainable land use, respect for local community rights, respect for human rights at work, and traceability and responsible sourcing and certification.
2.	Commitment to a moratorium on any land clearing or land preparation until the proposed	• PT TTL has released an official statement elaborating its MU's commitment to avoiding land clearing prior to assessment completion. Such statement was made on 21 March 2019.

	Integrated Conservation and Land Use Plan (ICLUP) has been completed or finalised	•	Interpretation of 22 November 2018 (the Assessment cut-off date) Landsat 8 OLI satellite image over the MU area indicates no land clearing. There is an area of 4,851.7 ha that has been developed into oil palm plantations, while the remaining are yet to be developed (2,344.3 ha are covered by bush, 1,592.4 ha by thickets, 1,057.8 ha by shrub, and the other 434.0 ha are barren soils)
3.	Demonstration of legal rights to or permit for exploring the Area of Interest ("AoI")	•	PT TTL has several operational areas that fall under two types of legality, i.e., Location Permit Concession and HGU concession. The total area is 11,079.4 ha (GIS analysis). The legality comes from the Government's official permits and marks the Company's concession in which it runs its operational activities.
		•	Some parts of PT TTL's Location Permit Concession overlap with PT Uni Primacom's concession. The Assessment team recommends that PT TTL MU make a written statement in, expressing the recognition of the overlapping condition and its commitment to resolving this issue with PT Uni Primacom and local governments. For this assessment, it should come to an agreement that the overlapping parts should be included by the Company's MU area, referring to the boundaries based on the Location Permit
		•	PT TTL's 2013 IUP concession covers an area of 9,200 ha within the MU area. The IUP concession is smaller than the Location Permit concession because there are parts of the Location Permit Concession that cannot be managed as plantations, including areas allocated for forest area and settlement, as well as others that overlap with PT Uni Primacom concession.
		•	PT TTL has initiated and held several meetings with the community concerning its presence and official permits obtained from the relevant local governments
4.	FPIC process has been initiated with full disclosure of the proposed project, with all potentially affected communities, and the process for further negotiation and consent is already agreed upon, with fairly appointed representatives	•	Information dissemination events and meetings to exchange information with community concerning FPIC implementation has already been organised by PT TTL MU. The community is represented by local village governments and traditional institutions. Meetings with community representatives are held in different locations of each affected villages (17 villages).
		•	The company has completed the documentation of the information dissemination events as FPIC evidence in the form of Partnership Minutes of Programme Information Dissemination Event with local villages. These meetings are attended by local village heads and their councils (BPD). FPIC process in PT TTL plantation development is already regulated under the Procedure-Indemnity of Planting Area (BGA-SOP-GL-903.1-R0). In addition, the Company has also organised the activity of Identifying Social Liability for the Loss of HCV 4, 5, 6 PT Tanah Tani Lestari in 2018 as part of its Land Use Change Analysis (LUCA) report.
		•	Before the Assessment process proceeds to Full Assessment, the MU has conducted more meetings with the community, following the Assessment team's recommendation concerning the HCV-HCS Assessment.
		•	Referring to the information from PT TTL MU and evidence of the meetings that have been submitted, it is known that the communities of the affected villages have approved and permitted the implementation of this Assessment in their village territories that include the MU areas and its surroundings. This approval is expressed in permission request letter and correspondence about this Assessment implementation

Initial requirements as the preconditions of this Assessment implementation have been met. Based on the due diligence output during the pre-assessment phase, it is concluded that the process of this Assessment for PT TTL can proceed to Scoping Study phase. PT TTL and BGA MU has expressed its commitment to environmental and social safeguard. In addition, the MU has specifically released an official statement that any activities related to new development would be suspended pending the complete process of the HCV-HCS Assessment and meeting of RSPO NPP.
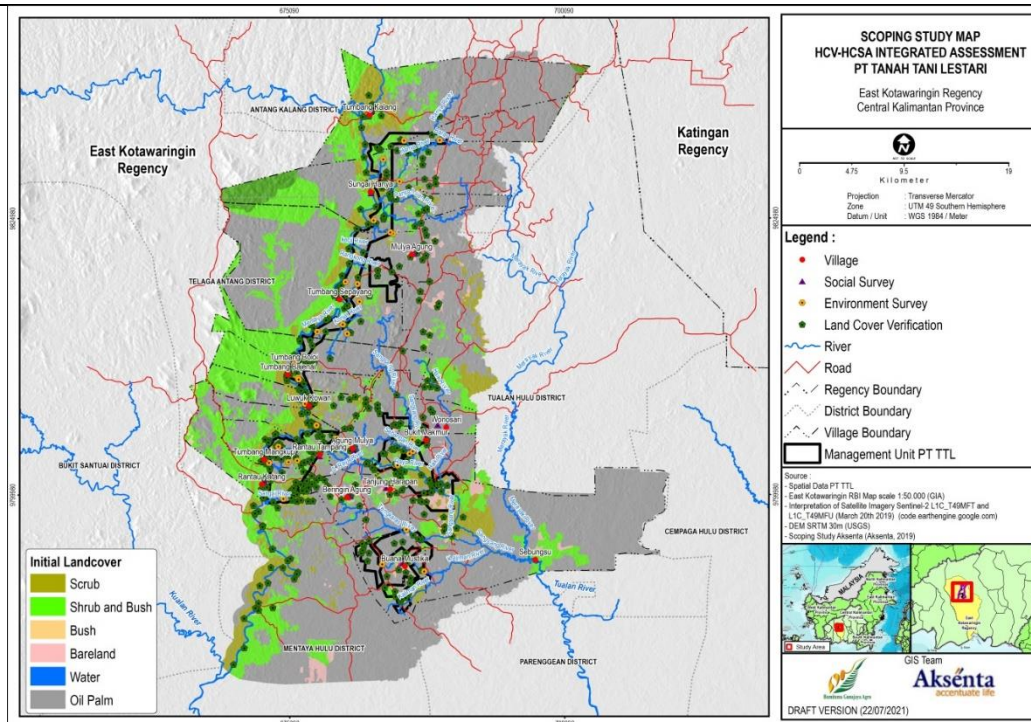
4.4. Scoping Study

4.4.1. Scoping Study Summary

Scoping study is guided by two main objectives: (i) to recheck and follow up information collected during pre-assessment phase; and (ii) to collect new data/information in the field. Scoping study activities include desktop study and secondary data review, field observation to collect data/information on environment (biophysical and bioecological aspects), land cover

verification, initial biomass carbon estimation to produce initial carbon stock statistical parameter (average and standard deviation), stakeholder consultation to identify major issues concerning the Assessment area, and consultation with local community to identify social conditions and status of the FPIC process that PT TTL has already carried out. It takes eight days for four Assessment team members to complete the scoping study (**Table 16**). Covering environmental biophysical observation, land cover verification and initial carbon estimation, the field survey is carried out in 332 locations within and around PT TTL MU area. Based on land cover classification, it is known that 50 locations are covered by shrub, 58 by thickets, 50 by bush, 52 are barren soils, 72 are covered by oil palms, and 50 others belong to water bodies/rivers (**Map 3**).

Table 16. Scoping Study phases and timeline

Activity	Description	Timeline
Information gathering	Opening meeting with PT TTL management to discuss plantation condition, the Company relationship with community, distance to the locations to visit, usable vehicles and addresses of stakeholders to visit, and provide initial information concerning the Assessment implementation referring to the Manual Assessment (HCVRN, 2018)	06 May 2019
Field visit	Field observation aims at identifying biophysical and ecological conditions, based on which the wider landscape (AoI) boundaries are to be defined. See Map 3 for locations visited in this activity	06 May 2019
Ground truthing of initial land cover map	This activity aims at verifying the initial land cover, which is carried out by two people using drone. See Map 3 for locations visited in this activity	06 – 08 May 2019
Stakeholder identification and initial consultations	Meeting with stakeholders at provincial level (in Palangkaraya) and district level (in Sampit). This activity aims to identify the major concerns and recommendations form the stakeholders regarding this Assessment. It is caried out through physical discussion where the team visits each stakeholder's office. See Table 17 for the consultation output	06 – 07 May 2019
Visiting sample of communities	Initial consultation with local community aims to identify respondents from community concerning PT TTL's planned oil palm plantation development, community's social conditions, verification of the FPIC process that the Company has carried out, requesting permission from and engagement of local community for FGD and PM activities during full assessment (full field survey). See Map 3 for locations visited in this activity and Table 17 for the consultation output	09 – 12 May 2019

Map 3. Location of observation spots in scoping study

Survey and initial consultation in this scoping study phase indicate the following important issues that becomes the full-assessment's major concern.

- Land cover that may potentially contain HCV-HCS values includes small-sized shrub fragments as well as thickets. These areas indicate the presence of Rare, Threatened and Endangered ("RTE") species, i.e., gibbon and sun bear, along with their habitats. These areas normally take place of locations once used for farming, characterised with the presence of rubber trees.
- PT TTL MU area is between two major rivers, i.e., Mentaya (to the west) and Merayak/Tualan (to the east). The area is situated in two water catchments, i.e., River Sangsang and Hanya water catchments. The latter is the second and third order tributary to Mentaya.
- Communities of 17 villages interact with and get affected by PT TTL operational activities. Traditional institutions and local governments are respected stakeholders and considered to represent community.
- Concerning social aspects, it is indicated that plantation sector is the main source of livelihood for communities in the Assessment area (where they work as workers, smallholders, and through partnership scheme). Before obtaining its permits, some parts of PT TTL concession have already been planted with oil palms.
- There are remains of locations or sites that are sacred and/or of cultural or historical values in the Assessment area.
- Concerning parts of PT TTL Location Permit Concession that overlap with that of PT Uni Primacom, the Assessment team is yet to obtain clear spatial information for verification. PT TTL MU is committed to coordinating with PT Uni Primacom and preparing a statement concerning such overlap.
- Through meetings that have been organised, the community has already been informed and can accept PT TTL's presence and its operational activity plan, including the implementation of this Assessment in their villages. However, they also ask that PT TTL to hold another socialization concerning the boundaries of its MU area because they do not clearly understand the boundaries in the field. This also relates to some lands in PT TTL concession that are yet to be compensated in land acquisition.

FPIC requirements at this scoping study have been met considering the following indicators: (i) local community agrees that village governments and traditional leaders represent them in general in their interaction with PT TTL and in this Assessment process; (ii) local community agrees to participate in further consultation activities, gives permission to and is willing to assist the Assessment team to map areas/sites important for meeting their life needs, areas/sites of cultural importance, and other areas included by this Assessment scope during the full-assessment phase; (iii) consent for the planned oil palm plantation development and the conservation areas recommended by the Assessment team will be agreed upon by PT TTL and community in final consultation activity; (iv) conservation areas will be managed collaboratively between the Company, community and other relevant stakeholders; and (v) community has stated that they would not need any external consultants in the negotiation process as they are already experienced and able to make decision independently.

4.4.2.   List of Consultation

Table 17. Summary of initial consultation in scoping study

Name	Organisation Social Group	Major Concern and Recommendation
Ahmad Muborak (Forest ecosystem conservation and public relations)	Central Kalimantan Natural Resources Conservation Agency ("BKSDA")	• Bumitama Agri Ltd. already has a cooperation with BKSDA for training on human-wildlife conflict mitigation. • In 2018, BGA supports a high school-level conservation cadre programme organised by BKSDA in Telaga Antang Sub-District (around PT TTL MU area). This activity focuses on land fire mitigation, afforestation, and environmental care. • Two cases of human-wildlife conflict have taken place (crocodile and human) in East Kotawaringin District, i.e., in Serangas and Teluk Sampit Sub-Districts and Belati Village. The locations are far from PT TTL MU area. • There are no conservation areas in East Kotawaringin District. The district is mostly used for oil palm plantation, so that chance is low to find the connectivity to forested areas
Okta Simon (Project Manager)	WWF Central Kalimantan	• WWF has no programme in East Kotawaringin District. Its programmes in Central Kalimantan are: (1) Sebangau Conservation Project; (2) Heart of Borneo (HoB) Programme; and (3) Forest Conversion Programme. • East Kotawaringin District is one of Central Kalimantan's oil palm-producing districts. There are many oil palm companies and smallholders in this district, so that size of forested areas is relatively low compared to other districts in the same province. • The Assessment to carry out should consider the connectivity to forests if forested areas are still found (landscape approach). • No environmental NGOs have work programme in East Kotawaringin Distric
Siti Maimunah (Agriculture and Forestry Faculty lecturer and social forestry expert)	Muhammadiyah Palangkaraya University	• East Kotawaringin District is one of the districts with the largest oil palm plantation area in Indonesia. • Community members around PT TTL mostly earn their livelihood from becoming oil palm smallholders and working in oil palm plantation companies, particularly in transmigrant villages. • In conducting an HCV-HCSA assessment, the team is expected not to assign HCV/HCS statuses to lands currently controlled by local community (where no compensation has taken place) as this may potentially spark conflicts between local community and companies. • Participatory mapping activities with community is important to carry out in an HCV-HCSA assessment.

		• Management and monitoring of HCV-HCS areas that have been identified are expected to engage all relevant stakeholders in the areas in question.
Endah Prihatin (Head of Environmental Management Department)	East Kotawaringin District Environmental Office	• Environmental pollution that becomes the major issue in Antang Kalang, Telaga Antang, and Tualan Hulu Sub-Districts takes place in River Mentaya because of community mining activities and oil palm plantations. • PT TTL and PT KMB which are BGA subsidiaries have performed environmental assessments provided under government regulations. • Community lands that have been identified as HCV or HCS areas should be compensated by the Company. If community declines to transfer their rights of these lands, they should be excluded from the Company concession.
Wijaya (Head of Spatial Planning Department)	East Kotawaringin District Public Works Office	• There is a difference between East Kotawaringin District Spatial Plan and Central Kalimantan Provincial Spatial Plan. This is because East Kotawaringin's spatial plan was developed and approved before Central Kalimantan's. • Spatial Plan maps used should refer to East Kotawaringin District Spatial Plan Map, the soft copy of which can be obtained from my GIS staff. • Several oil palm plantation companies that obtained oil palm plantation permits before East Kotawaringin's Spatial Plan Map was approved in 2015 are not in violation of the spatial plan
Chandra (Sustainability Field Coordinator)	Bumitama Agri, Ltd. (PT KMB and PT TTL)	• PT TTL HGU concession is dominated by shrubs and thickets, especially by River Mentaya. • All of PT TTL HGU and Location Permit concessions can be accessed using motorcycles and cars. However, we must walk to access shrub and thicket areas.
Anton (Corporate Social Responsibility ("CSR") Department Staff)	Bumitama Agri, Ltd. (PT KMB and PT TTL)	Communities around the Company concession have been informed of the plan to conduct this Assessment. All local villages welcome the Assessment activities. However, several village government officials are not in their villages right now because they are attending an invitation from the District Government in Sampit City
Eka Putra (Village Head)	Tumbang Mangkuk Village, Telaga Antang Sub-district	• Information on oil palm plantation project have been disseminated since 2009, represented by PT KMB staff. This has been conducted through several meetings up to 2018. • The materials to present in information dissemination event include locations and area of the concession, the planned nucleus and partnership plantation development, and compensation procedure. • Tumbang Mangkup Village community welcomes the Company presence and this Assessment. • Before the Assessment team came, the Company representative has already lobbied local village governments and sought permission for this Assessment. • Tumbang Mangkup Village is an old (native) village. • The village accessibility: it can be accessed through a road built by the government.
Tanjung Harapan (Village Head)	Tanjung Harapan Village, Telaga Antang Sub-District	• Information on the Company's oil palm development project has been disseminated since 2012, which was at the time the Company was conducting a partnership programme with Tanjung Harapan Village. • The materials of information disseminated include partnership technicalities, rights and responsibilities between the Company and the community as its partners. • Tanjung Harapan Village community welcomes the Company presence and this Assessment. The Company has

		confirmed on this by sending a letter to request permission to conduct this Assessment. • Village accessibility: through a road built by the government and oil palm plantation companies. • Tanjung Harapan is a transmigrant village established in 1986
Mahir L Mambay (Mantir Adat/ Assistant to Dayak Chief)	Tumbang Sepayang Village, Antang Kalang Sub-district	• This is an old village that was presumably established since 1830 • The majority of community who populates Tumbang Sepayang Village is Dayak Ngaju Community • Information dissemination events concerning the planned oil palm plantation development project was once organised by the Company. • The materials presented include the planned development of nucleus and village partnership plantations. • Tumbang Sepayang Village can be accessed using oil palm company roads and River Mentaya waterway. • Tumbang Sepayang community already welcomes the Company presence and this Assessment. However, it is expected that before assigning HCV or HCS areas, the company consult the community or their representatives
M. Amin (Village Head)	Wonosari Village, Tualan Hulu Sub-district	• Wonosari is a transmigrant village that was established in 1997. • The village area is entirely settlement areas and community and company's oil palm plantations. • Wonosari Village community welcomes this Assessment and the team. • In conducting this Assessment, it is expected to engage Wonosari Village community
Ahmad Muzali (Village Head)	Buana Mustika Village, Telaga Antang Sub-district	• Before the Assessment team came over, the Company has informed the plan for this Assessment and we as the community representatives welcome this Assessment in our village. • The Company has carried out an information dissemination event in 2010 where it presented the planned development project of its nucleus and partnership plantations • Buana Mustika Village community welcomes the Company presence. • Buana Mustika is a transmigrant village established in 1986. • The village can be accessed through a road built by the government as well as company oil palm plantation road
Astono (Village Head)	Tumbang Boloi	• Tumbang Boloi is an old village established in 1920 • An HCV-HCSA Assessment activity was once carried out by PT BAT (Sinarmas Group), and all area important to community has been mapped. The map is available in village office • Tumbang Boloi community welcomes the Assessment team, and the Company management has notified us of this activity through its letter in March 2019
Haidirsyah (Village Head)	Tumbang Kalang Village, Antang Kalang Sub-district	• This is a native village that becomes the seat of Antang Kalang Sub-District. • The village is mostly plantation areas, particularly community and company oil palm plantations. The village no longer has natural forest. Only shrubs and blocks of community mixed gardens remain. • PT TTL management has informed us of the Assessment plan and the village government has approved the plan and welcome the presence of Aksenta team

| Ujianto (Village Head)	Bukit Makmur Village, Tualan Hulu Sub-district	• This is a transmigrant village since the end of 1980s, mostly populated by people from Central and East Java, along with local native community. • Some parts of the village area are oil palm plantations. Most of the village territory is included by PT TTL concession and border PT HAL and PT Uni Primacon concessions. However, shrub-covered fragments are still found in its southern part • Referring to the map from participatory mapping, it is likely that some parts of PT TTL concession in the field are PT Uni Primacom's operational area. • PT TTL management once planned to measure the plantation areas together with village official but this plan is yet to materialise. • PT TTL management has informed the plan for this Assessment. In general, community welcomes the plan and is willing to participate in the activities
Nuryadin (Village Head)	Rantau Katang Village, Telaga Antang Sub-district	• This is a native village having established since the Independence Day. • Its territory mostly constitutes oil palm plantations managed by community and companies. Three companies operate in this area, i.e., PT TTL, PT BAT and PT AWL. • Shrub fragments are still found to the west of River Mentaya. • Rantau Katang Village community has been informed of the planned Assessment and they give permission for its implementation
Surohman (Village Head)	Agung Mulya Village, Telaga Antang Sub-district	• This village is also a transmigrant village, populated by Javanese (95%) and local communities (5%). • Almost the entire village is farmland. Most of the territory takes form of oil palm plantations. PT TTL HGU concession is in the village territory • Community welcomes the Assessment team and is willing to participate in the Assessment.
Rudi Antonius (Village Head)	Rantau Tampang Village, Telaga Antang Sub-distrcit	• As a native village, Rantau Tampang is populated by Dayak community (75%) while the remaining includes Javanese, Batakese, Florenese and Sundanese. • The village territory is mostly oil palm plantations managed by communities and companies (PT BAT, and PT TTL/PT KMB). Apart from oil palm plantations, there are also rubber plantations and mixed gardens, as well as shrubs in small areas. This village also has irrigated rice fields on swamps. • Representing local community, village officials declare to have been informed of this Assessment and welcome the Assessment team in their village.
Toryanto (Village Head)	Beringin Agung Village, Telaga Antang Sub-district	• This is a transmigrant village. They came from Java and few others are local community. • Most of the village are oil palm plantations managed by PT TTL (known by community as PT KMB). • Concerning this Assessment, community welcomes the Assessment team and is willing to participate in the activities.

4.5. Full Assessment

4.5.1.   Description of AoI

AoI Boundaries

AoI boundaries are defined by identifying watershed and geographical terrain units with ecosystem clusters interacting one another, land covers, and villages. The AoI size is 97,595.7 ha (**Map 4**). PT TTL's MU area is situated within two water

catchments/geographical terrain units, i.e., water catchments of River Sangsang and Hanya which is the segment of Mentaya catchment. River Sangsang and Hanya are, respectively, the second and third orders of Mentaya. Analysis of 2007, 2013, and 2019 satellite images indicates that land covers in both PT TTL's MU area and its surroundings are dominated by oil palm plantation and community farms. Semi-natural land covers (thicket and shrub) are commonly only found along Mentaya buffer zone, and no potential connectedness are found to secondary forest areas. However, the land covers are presumably potential habitats to RTE species (*Hylobates albibarbis* and *Helarctos malayanus*). The MU area is situated in 17 villages, so that the Company's activities may potentially affect the local community.
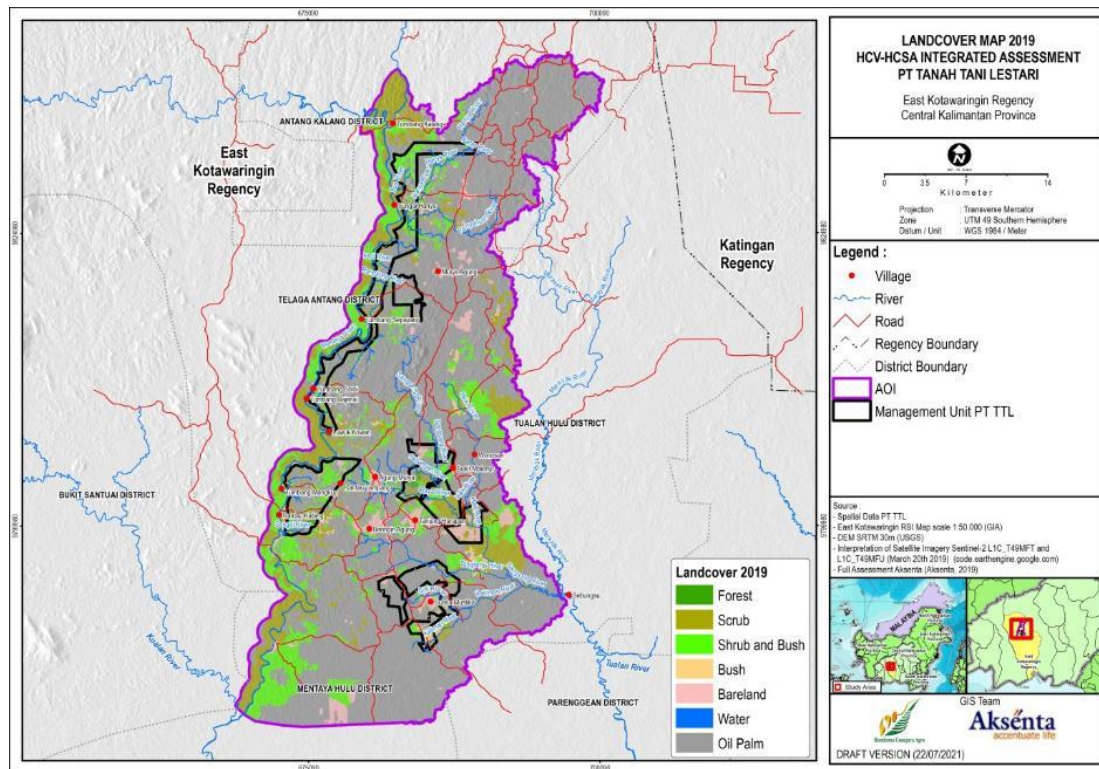
Map 4. Map of 2019 cut-off land cover classification and AoI boundaries

Landscape Context

Physical and Environmental Characteristic

AoI physical and environmental characteristics are as follows:

- The AoI is between Mentaya Hulu and Meraya/Tualan sub-watersheds, which are segments of Mentaya watershed. There are 32 rivers in the AoI, including Mentaya, Hanya, Penyahuan, Konjat, Sangsang, Raya, Tengkaras, and Haik.
- The AoI is classified as a wet tropical climate area based on Schmidt-Ferguson classification. Its annual precipitation varies from 1,930-3,500 mm with an annual average rainfall of 94-158 days. It has an equatorial rainfall pattern with two peaks of the wet season from April-May and November-December. In dry season, the area's monthly precipitation is 60 mm.
- Elevation ranges from 5-216 m a.s.l. The AoI is dominated by areas with elevation of less than 58.8 m a.s.l. (83%). The highest is found in the northern part of the AoI (upstream of the Hanya River), while the lowest is in the south-eastern part of the AoI (Sangsang estuary).
- Flat to undulating areas are dominated by the class of less than 8% slope (around 70% of the AoI area). The relatively flat areas are found around major rivers (Mentaya, Hanya, Sangsang and Haik). Areas with more than 25% slope (steep to very steep) are only found in few parts of the AoI (0.8%), i.e., around Bahagia Hill (centre part of the AoI).

- Based on geological map, it is known that the AoI consists of five geological formations: Dahor (TQd), Sintang Intrusion Rock (Toms), Sepauk Tonalit (Kls), Matan Volcanic/Complex Rock (TRvk), and Pinoh Metamorphic Rock (PzTRp).
- According to RePPProT (1985), the AoI land systems include Honja (HJA), Pakalunai (PLN), Rangankau (RGK), Bawin (BWN) and Lohai (LHI). No potential peatlands are indicated by these land systems.
- The AoI has five soil types, i.e., Dystrudepts, Alluvium, Paleudhults, Plintudhults and Udifluvents. The dominant ones in the AoI include Dystrudepts and Paleudults.

Biological and ecological characteristics

The AoI is in Borneo that biogeographically is considered an oriental region. The island's biodiversity is considered high as it is a habitat to tropical rainforest ecosystems. Concerning fauna species group, Borneo has 639 bird species (MacKinnon *et al.*, 2000); 166 snake species (Stuebing & Inger, 1999); approximately 140-150 amphibian species (Inger & Stuebing, 1997); and 225 terrestrial mammal species, 44 out of which are endemics (Payne *et al.*, 2000). Its flora group includes about 14,500 species, 4,000 out of which are endemics (Roos *et al.*, 2004).

See below the description on the Assessment area position against conservation areas and other key biodiversity areas.

- Conservation Area (CA). The AoI is far from any CA. The nearest distance is 50 km north to Bukit Baka Bukit Raya National Park and 85 km southwest to Tanjung Puting National Park.
- Key Biodiversity Area (KBA) and Important Bird Area (IBA). The AoI is outside KBA and IBA. The nearest distance is 50 km north to Bukit Baka Bukit Raya (KID 05).
- Endemic Bird Area (EBA). The AoI is outside EBA. The nearest distance is 80 km to EBA 157 of Borneo Mountain.
- Ramsar Site. The AoI is outside Ramsar sites in Borneo. The nearest distance is 85 km to Tanjung Puting.
- Intact Forest Landscape ("IFL"). There are no IFLs in the AoI and its surroundings. The nearest IFL is located 60 km north of the AoI.

Referring to IUCN's Red List of Threatened Species, several RTE species are distributed in an area that includes the AoI. The faunas include Sunda pangolin (*Manis javanica*) and orangutan (*Pongo pygmaeus*) bearing Critically Endangered (CR) status; Proboscis monkey (*Nasalis larvatus*) and Bornean white-bearded gibbon *(Hylobates albibarbis)* with Endangered (EN) status; and sun bear *(Helarctos malayanus)*, Sambar deer *(Rusa unicolor)*, false gharial *(Tomistoma schlegellii)* and Amboina box turtle *(Cuora amboinensis)* with Vulnerable (VU) status. In flora group, several RTE species are from Dipterocarpaceae family, such as keruing (*Shorea gibbosa*) and keruing (*Dipterocarpus tempehes*) with Critical (CR) status; and mersawa (*Anisoptera marginata*) with EN status.

Social, Cultural and Economic Characteristics

The AoI are located in 17 village administrative territories and three sub-district administrative territories in East Kotawaringin District. Referring to East Kotawaringin District Regulation No. 4/2016, there are two village types in the AoI, i.e., native and transmigrant villages. Out of the 17 villages, 10 are native villages, while the other seven are transmigrant villages (**Table 18**). Native villages in the AoI are along Mentaya River and other areas closer to the river, while transmigrant villages located in areas further from the rivers.

Table 18. Demographic condition and typology of local villages in the AoI

No.	Village	Sub-district	Typology	Area (ha)	Population	
					Family	People
1	Tumbang Kalang	Antang Kalang	Native	12,667	1,051	2,380
2	Sungai Hanya	Antang Kalang	Native	12,371	218	840

3	Mulya Agung	Antang Kalang	Transmigrant	2,011	378	1,180
4	Tumbang Sepayang	Antang Kalang	Native	16,322	218	719
5	Tanjung Harapan	Antang Kalang	Transmigrant	2,562	675	1,680
6	Tumbang Boloi	Telaga Antang	Native	4,932	197	800
7	Tumbang Bajenai	Telaga Antang	Native	2,936	86	322
8	Luwuk Kuwan	Telaga Antang	Native	3,564	144	525
9	Agung Mulya	Telaga Antang	Transmigrant	3,891	525	1,855
10	Rantau Tampang	Telaga Antang	Native	3,061	225	770
11	Tumbang Mangkup	Telaga Antang	Native	2,277	220	300
12	Rantau KAtang	Telaga Antang	Native	4,027	205	804
13	Beringin Agung	Telaga Antang	Transmigrant	1,954	570	2,207
14	Buana Mustika	Tualan Hulu	Transmigrant	3,952	444	1,545
15	Wonosari	Tualan Hulu	Transmigrant	1,633	200	700
16	Bukit Makmur	Tualan Hulu	Transmigrant	3,441	174	588
17	Sebungsu	Tualan Hulu	Native	18,302	321	989
			Total	**99,911**	**5,853**	**18,240**

Source: Social survey output (Aksenta, 2019)

Ethnicity and religious diversity in the AoI villages are relatively high (**Table 19**). Native peoples from Dayak Ngaju are found living in transmigrant villages, and migrant communities are also found to live in native peoples' villages. Despite high diversity of ethnicity and religion, to the date this Assessment is carried out, no issues have been found indicating potential horizontal conflict.

Table 19. Ethnic groups and religions of local community in the AoI

No.	Village	Ethnic Groups	Religion
1	Tumbang Kalang	Dayak Ngaju, Javanese, Batakese, Banjarese, and Florenese	Kaharingan, Islam, Roman Catholicism, and Protestantism
2	Sungai Hanya	Dayak Ngaju, Javanese and Bimanese.	Kaharingan, Protestantism, Islam, and Roman Catholicism
3	Mulya Agung	Javanese, Balinese, Dayak Ngaju, and Sundanese	Islam, Protestantism, and Kaharingan
4	Tumbang Sepayang	Dayak Ngaju, Javanese, Madurese and Batakese	Kristen, Kaharingan, and Islam
5	Tanjung Harapan	Javanese, Sundanese, and Dayak Ngaju	Islam, Protestantism, and Kaharingan
6	Tumbang Boloi	Dayak Ngaju, Javanese and Batakese	Kaharingan, Kristen, and Roman Catholicism
7	Tumbang Bajenai	Dayak Ngaju and Javanese	Kaharingan, Islam, Protestantism
8	Luwuk Kuwan	Dayak Ngaju and Javanese	Kaharingan, Protestantism, and Islam
9	Agung Mulya	Dayak Ngaju, Javanese and Sundanese	Islam, Roman Catholicism, Protestantism, and Kaharingan
10	Rantau Tampang	Dayak Ngaju, Javanese, Batakese, Florenese, and Sundanese	Islam, Roman Catholicism, Protestantism, and Kaharingan
11	Tumbang Mangkup	Dayak Ngaju, Javanese, Padangese, Batakese, and Bugis	Islam and Protestantism
12	Rantau Katang	Dayak Ngaju, Javanese, Banjarese and Buginese	Islam, Roman Catholicism and Protestantism
13	Beringin Agung	Javanese, Sundanese, Dayak Ngaju	Islam, Kaharingan, Roman Catholicism, and Protestantism
14	Buana Mustika	Javanese, Dayak Ngaju, and Sundanese	Islam, Kaharingan, Roman Catholicism, and Protestantism

15	Wonosari	Javanese, Sundanese, Lombok, and Dayak Ngaju	Islam, Kaharingan, Roman Catholicism, and Protestantism	
16	Bukit Makmur	Javanese, Sundanese Dayak Ngaju	Islam, Roman Catholicism, Protestantism, and Kaharingan	
17	Sebungsu	Dayak Ngaju, Banjarese and Javanese	Protestantism, Islam, and Kaharingan	

Source: Social survey output (Aksenta, 2019)

Local community has not depended on forest resources to meet life needs since a long time ago. The majority of community in all AoI villages earns their livelihoods from agricultural sector, i.e., oil palm and rubber plantations, as well as from having own business activities and working in oil palm plantation companies. Some of them have converted rubber into oil palm as the latter is considered more profitable, while some others are also keen to develop swiftlet farming. All life needs are met from buying at shops in local villages, from peddlers and at the markets in the sub-district capital.

The villages in the AoI already have adequate infrastructures. All the villages are already connected to one another and sub-district capital through roads. All sub-districts have several supporting infrastructures for community life such as local clinics (Puskesmas), government offices and markets.

Social organizations in the AoI include cooperatives, ethnic group associations and Dayak Traditional Council (DAD). The cooperatives are the place for community to manage oil palm plantations in their capacity as company partners or independent managing unit. Established to connect fellow members, ethnic group associations are used by community to meet with each other. DAD is Dayak community's traditional representative council whose structure includes village, sub-district, district, and provincial levels.

Community rights to lands and natural resources suggest that all lands are individually controlled by communities of the AoI villages. No land and/or other natural resource is communally controlled or possessed. Community gains land tenure through inheritance and/or buying. Uses of community lands completely depend on the decision of the landowner/controller.

Land use and tendency for development

Land uses in the AoI are dominated by farming that can be divided into: (i) large-scaled oil palm plantation; (ii) community oil palm plantations; and (iii) rubber plantations, mixed gardens and farms. Other land uses in the AoI include settlement areas and water bodies as sources of water and fish. No areas are found with forest functions. The nearest secondary forest is found in the western part of Sungai Hanya Village but not included by the AoI scope.

The AoI can be categorised as an area having already developed for modern uses and it has populations relatively dispersed but connected to one another. All of the AoI villages are already connected through asphalt roads and have adequate settlement infrastructures and facilities.

The AoI development tendency can be predicted using retrospective approach and through the spatial plan in the area. Most of the area is allocated for agriculture. Since 2007, settlements and roads connecting the 17 villages have been constructed. Oil palm plantation area significantly increased in 2007-2013 by almost 50% of the 2007 area but then drastically decreased in the next six years (2013-2019). Oil palm plantation area increased only by 7% of 2013 area.

Satellite Image Analysis and Land Cover Classification

Satellite image analysis for generating initial and final land cover classifications is carried out over two Sentinel-2 satellite images, with specification as follows: (i) Image type: Sentinel-2 (L1C_T49MFU_A019534_20190320T025757) and Sentinel-2 (L1C_T49MFT_A019534_20190320T025757); (ii) Date of Acquisition: September 2019 (Map 5); (iii) Spatial Resolution: 10 m and (iv) Cloud Cover (%): <5% in the AoI, <2% in the Assessment area. A series of image pre-processing activities, i.e., spectral enhancement and radiometric-atmospheric calibration, are performed over two satellite images before classifying the land cover using Sen2Cor in Sentinel Application Platform (SNAP) software.

Land covers are classified by combining Object-Based Image Analysis (OBIA) and visual interpretation with manual digitisation of Sentinel-2 image mosaics. Manual digitisation is applied to polygons that remain unsegmented during the OBIA process,

some of which are manually digitised based on field findings using ArcGIS 10.4 software. Segmentation process through OBIA approach is conducted using eCognition Developer 64 software.

Initial land cover interpretation is carried out through object-based visual interpretation, combining 208 training samples in the form of imaginary spots. Land cover classification is then verified against spots of ground truthing carried out during scoping study. Land cover class verification has 332 spots set through purposive sampling, taking into account land cover classes presumed to have different satellite image colours. Field verification indicates the difference between the interpretation output and the actual condition on the ground. For instance, locations interpreted as natural vegetation in the initial land cover turn out to be oil palm plantation because of their resembling colours. This is because of the limited capacity of Sentinel 2 satellite that can only identify objects based on their colours.

Accuracy assessment uses field verification spot as the test spot. Scores of the overall accuracy assessment and kappa accuracy are respectively 96.1% and 95.3%. These scores already meet the requirements under the HCSA Toolkit (70%) and the kappa accuracy score falls at 'almost perfect opportunity' category. As such, full assessment can refer to the output of this initial land cover classification.

The corrected land cover classification is then re-verified for generating the final land cover. The re-verification is conducted by performing accuracy assessment over the corrected initial land cover against the ground truthing spots (332 spots), forest inventory (31 spots), and additional verification spots during full assessment (30 spots). The result from forest inventory has shown that several plots designated as shrub class turn out as part of forest class following the carbon tonnage measurement. A similar result is also apparent in scrub class' plots which in fact qualified as shrub. Hence, Land Cover reclassification is conducted to obtain appropriate final land cover for Patch Analysis step. The output of the accuracy assessment is 93.9% for the overall accuracy assessment score and 92.9% for the kappa accuracy score. These scores meet the minimum HCSA Toolkit requirement, which is 80%. As such, the final land cover classification can be used to categorise the land cover into HCS classification (**Table 20 and Map 6**). Names of the land covers generated refer to SNI 7645-1:2014 on Land Cover Classification - Part 1: Small and Medium Scales (**Table 21**).
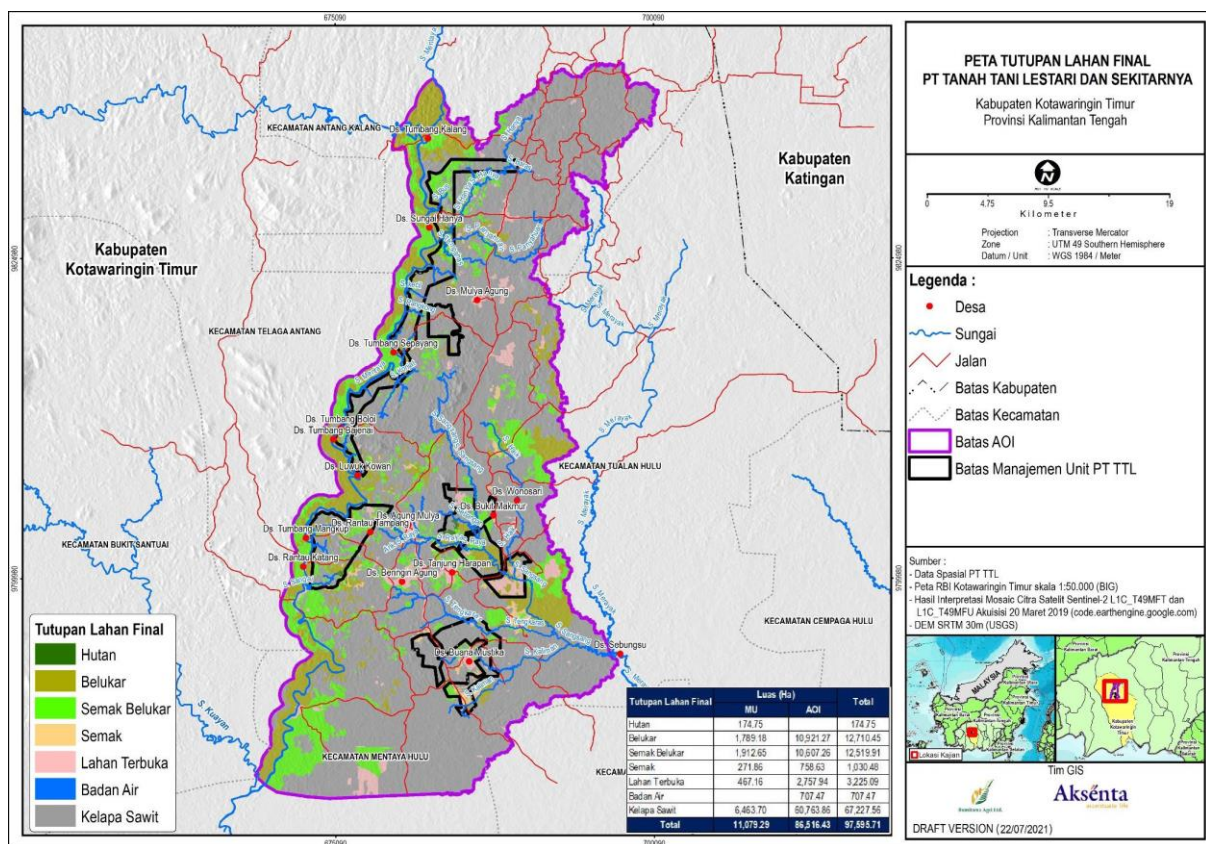
Table 20. Area and classification of final land cover in the Assessment Area

Land Cover Class*	MU Area		AoI Area	
	Ha	%	Ha	%
Forest	174.7	1.6	174.7	0.2
Shrub	1,789.2	16.1	12,710.5	13.0
Thickets	1,912.7	17.3	12,519.9	12.9
Bush	271.9	2.5	1,030.5	1.1
Barren Soil	467.2	4.2	3,225.1	3.3
Oil Palm	6,463.7	58.3	67,227.6	68.9
Water Body	-	-	707.5	0.7
Total	**11,079.4**	**100.0**	**97,595.7**	**100.0**

*SNI 7645-1:2014 on Land Cover Classification – Part 1: Small and Medium Scale
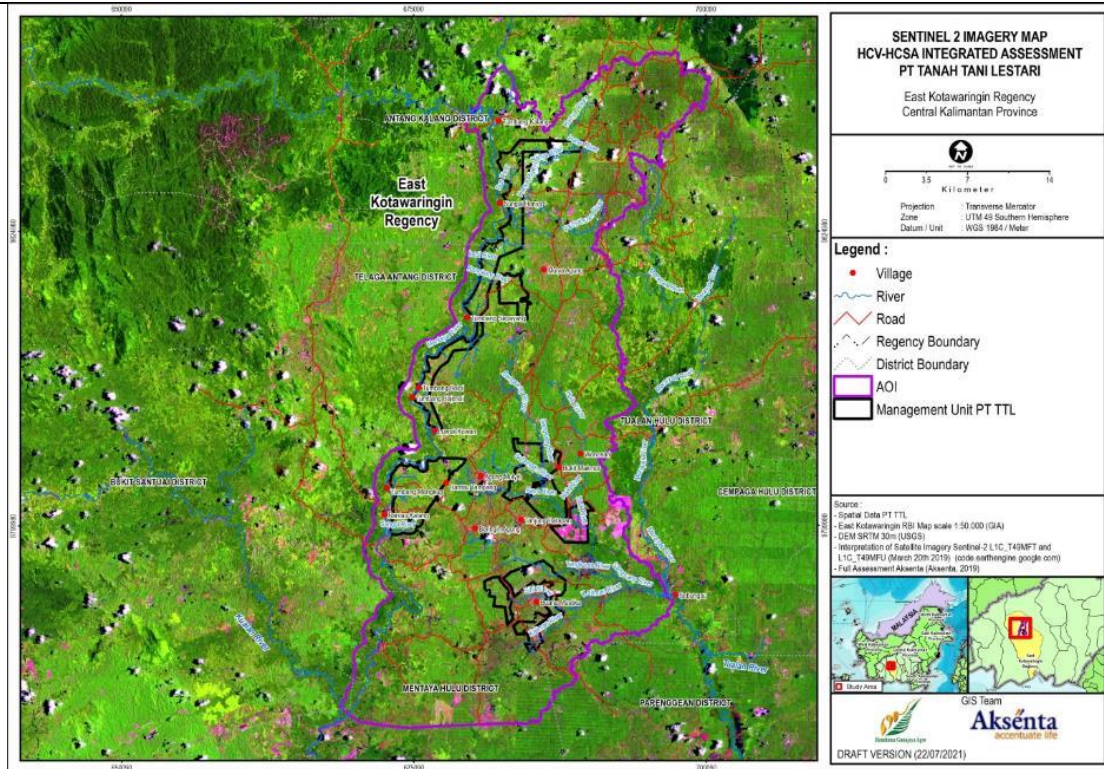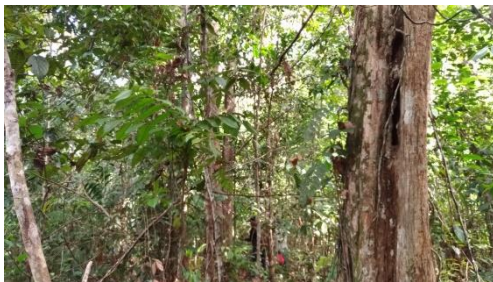
Map 5. September 2019 Sentinel 2 satellite image on the Assessment Area and its surroundings

Map 6. Final land cover in the Assessment Area

No.	SNI Land Cover Classification*	HCS Land Cover Classification**	Description/Images of Land Cover Condition
			Table 21. Final land cover condition
1	Forest	Low-Medium Density Forest ("**LDF-MDF**")	▪ SNI: forest that grow and develop on dryland at lowland area, and suffers human intervention. Medium forest: 41%-70% vegetation density ▪ HCS: natural forest with close to open canopy cover, with higher in vegetation diversity. Inventory data show the occurrence of a dbh >30 cm tree and the vegetation was dominated by climax species. Carbon tonnage 75-90 Cton/ha (LDF), 90-150 Cton/ha (MDF). ▪ Assessment finding: small patches of the remaining forest surrounded by shrub (YRF) land cover. Forest is the most natural land cover types, despite there are some commodity plant (i.e. rubber tree) and several pioneer species (i.e. *Macaranga* spp., *Ficus* spp., etc.)
2	Shrub	Young Regenerating Forest ("**YRF**")	▪ SNI: Dryland occupied by various natural vegetation, undergoing heterogeneous diversity with low to high density, and dominated by low vegetation. This land has been subject to anthropogenic intervention or logging activities. ▪ HCS forest that has undergone severe disturbance or are in the process towards its original natural structures. It is dominated by trees with Diameter at Breast Height (**"DBH"**) of 10-30 cm and has the frequency of pioneer species higher than that in low density forest. It is likely that this land cover class also includes some parts of community farmlands. ▪ Assessment finding: the shrubs in the AoI are community rubber plantations that they have managed for quite long. These shrubs are dominated by rubber trees associated with pioneer tree species. As such, not only do shrubs have trees with DBH>30 cm more than those in other land cover classes, they also have tree species diversity.

3	Thickets	Scrub	▪ SNI: Drylands where vegetation has regrown (undergoing succession) but the process is not optimal yet, or drylands with rare tree cover or drylands dominated by low vegetation. Such appearance normally no longer indicates the previous logging activity/patch. ▪ HCS: Area that was once a forest but has been cleared not so long ago. Dominated by low shrubs with limited canopy cover. This cover class includes tall grasslands, ferns and distributed pioneer tree species. Patches of older forests can be found in this land cover class. ▪ Assessment finding: thickets in the AoI also constitute community rubber plantations. They are also dominated by rubber trees and associated with other pioneer species. However, thickets have range and composition of trees with DBH smaller than shrubs.	
4	Bush	Open Land	▪ SNI: Drylands where various homogeneous vegetation species grow with low density, dominated by grass and cogon grass. ▪ HCS: Lands that have been cleared not so long ago, covered by grass or plants. Few woody plants can be found. ▪ Assessment finding: bush in the AoI are lands that have been cleared not so long ago, most of which have been occupied by grass and bush vegetation. In several locations in the AoI, areas of abandoned/not maintained oil palms are also found to be covered by bush.	
5	Oil Palm	Agri/Agricultural Estate	▪ SNI: Lands used for agricultural activities with homogeneous plants such as oil palm. ▪ HCS: Examples include large-scaled oil palm plantation overlapping with development area. ▪ Assessment finding: oil palm land cover class in the AoI includes oil palms owned by companies operating in the area and local community.	
6	Barren soil	Built-up Areas	▪ SNI: Land used for settlements that include urban and rural settlements, industries, public facilities, etc. that make distinctive appearances. ▪ HCS: Developed areas. ▪ Assessment finding: barren soils in the AoI include village settlements, along with community infrastructures and developed areas owned by plantation companies in the area.	

7	Water Bodies	Water Body	• SNI: Any aquatic appearances including sea, dam, lake and river. • HCS: river, lake and others. • Assessment finding: water bodies found in the AoI include rivers flowing down the area, such as Mentaya.	

4.5.2. Social Field: method and output

Social Method

Literature review is conducted to references and maps relevant to the AoI from libraries, sources from the internet, and corporate documents. This aims to obtain an overview of socio-cultural and economic conditions of the local community in the AOI and develop hypotheses on potential presence of Social HCV-HCS areas and locations used by local community to meet their needs (**Table 22**).

Table 22. Source of secondary data and information for the Assessment's social field

No.	Data and Information Sources
1	Spatial data on PT TTL HGU and location permit concession boundaries (PT TTL, 2019)
2	PT TTL HGU and location permit documents (PT TTL, 2019)
3	PT TTL area management agreement with PT KMB (PT TTL, 2019)
4	PT TTL Environmental Management and Monitoring Activity Report, 2018
5	Indonesia Topographic Shapefile, 2018
6	Ethnicity distribution (https://www.ethnologue.com/map/ID_sm_), 2019
7	Kecamatan Antang Kalang Dalam Angka (BPS, 2018)
8	Kecamatan Telaga Antang Dalam Angka (BPS, 2018)
9	Kecamatan Tualan Hulu Dalam Angka (BPS, 2018)
10	Kabupaten Kotawaringin Timur Dalam Angka (BPS, 2018)
11	Landsat 8 satellite image, acquired on 22-11-2018
12	PT TTL Social Impact Assessment Review and Update Report (Aksenta, July 2018)
13	Identifying Social Liability for the Loss of HCV 4, 5 and 6 in PT Tanah Tani Lestari (PT TTL, 2018)

This Assessment is a rapid assessment using the method that prioritises qualitative approach to respondents. This method is selected because of the Assessment nature and time efficiency needed. HCV is a specific information on specific subjects from specific individuals. In addition, this is also necessary to meet the requirements as participatory assessment, represent social group and meet FPIC principles as recommended in the Toolkit.

Respondents of all Assessment phases are selected through purposive sampling method based on the key stakeholders or those who represent the interests of social groups in each administrative area within the AoI. Included in respondents are PT TTL MU management (headquarter and site offices). In-depth interview is carried out with each informant using guided questions. Each of them is then sampled using snowball sampling (Hendriks et al., 1992)[17] with triangulation method to reduce bias (Olson, 2004).[18]

Respondent criteria are those who have information on village areas, land uses and land use history, as well as local community culture, areas of important values to community and presence of forest areas. Therefore, village head and officials, traditional or religious leaders, elders or community leaders, smallholder groups and management of cooperatives in partnership with the company are selected as the informants. Snowball sampling allows tracing of the most competent

respondents for answering questions on HCV presence and direct consultation with stakeholders who are concerned with the HCV/HCS areas. FPIC Principles are used in identifying HCV 5 and 6 with local community.

Being not representative to the entire population, limiting factors in snowball sampling method are balanced with the use of purposive sampling and triangulation. This way, the Assessment is not a census of the entire population. Number of respondents are not quantitatively defined in the beginning as the representative of the entire population. It grows and represents the AoI in spatial aspects and can be qualitatively accounted for, representing social groups.

Primary data collection or social field work applies the approach of consultation with local community. Local community members selected as respondents are those who have interaction concerning natural resources control and use and are affected by the Company operational activities. As many as 17 villages meet the requirements of social field assessment. To gain spatial information from respondents, this Assessment uses participatory mapping method. Focus Group Discussion (FGD) is also used during the field assessment. Information is also verified on the ground through direct observation (ground truthing).

Field activity output: interview/discussion, participatory mapping, and field survey

Consultation with local community representatives involves 114 respondents/informants from 17 villages, 92 of which are males and the remaining 22 are females (**Table 23**). Participatory mapping and FGD activities are organised simultaneously by the same participants. See **Map 7** for social survey spots.

Table 23. Number of respondents by village and gender

No.	Village	Sub-district	Respondent Number		Total
			Male	Female	
1	Tumbang Kalang	Antang Kalang	2	1	3
2	Sungai Hanya	Antang Kalang	16	1	17
3	Mulya Agung	Antang Kalang	4	1	5
4	Tumbang Sepayang	Antang Kalang	6	-	6
5	Tanjung Harapan	Telaga Antang	9	3	12
6	Tumbang Boloi	Telaga Antang	5	2	7
7	Tumbang Bejanai	Telaga Antang	2	2	4
8	Luwuk Kuwan	Telaga Antang	7	2	9
9	Agung Mulya	Telaga Antang	9	4	13
10	Rantau Tampang	Telaga Antang	10	1	11
11	Tumbang Mangkup	Telaga Antang	7	1	8
12	Rantau Katang	Telaga Antang	11	2	13
13	Beringin Agung	Telaga Antang	4	2	6

Source: Social survey (Aksenta, 2019)
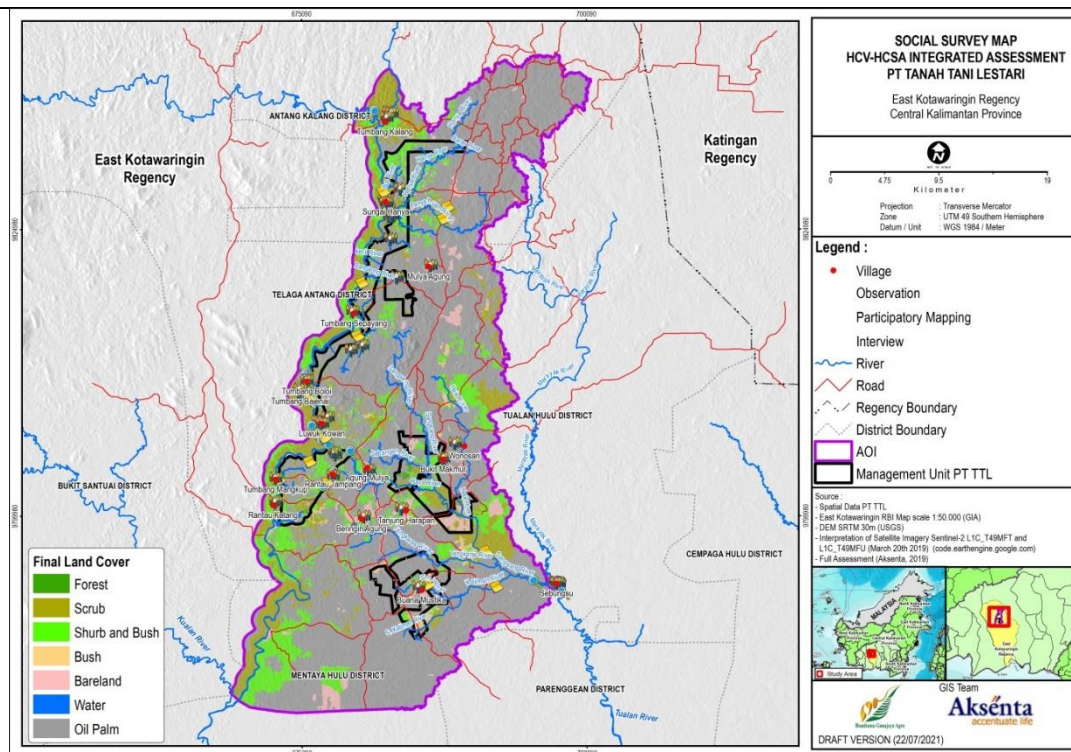
Map 7. Social sampling spot

Consultation output indicates that most of the community in the AoI currently earn livelihoods from becoming oil palm smallholder and working in plantation companies. In addition, it is also known that most of them are yet to clearly aware of PT TTL concession boundaries and no forest areas are found of importance to local community in the Company concession. Community consultation indicates that their sources of livelihood do not depend on forest resources. This is according to respondents from Tumbang Sepayang, Tumbang Bajenai, Luwuk Kuwan, Rantau Tampang, Beringin Agung, Buana Mustika, Wonosari, Bukit Makmur and Sebungsu Villages.

All villages already have relatively adequate health and educational infrastructures, and accessibility. Most of the local communities earn livelihood from working in oil palm plantation companies and becoming oil palm and rubber smallholders. There were no subsistent farming activities and the utilization of forest resources by the local community to fulfill their daily needs. Tumbang Sepayang Village has rice fields, while some of community members in Rantau Tampang, Rantau Katang and Agung Mulya Villages still have farming activities in irrigated and non-irrigated rice fields.

Several families still use rivers as their source of water for sanitation and fishing. These rivers include Mentaya, Tangkiran, Kojat, Sangsang, Sebangan, Raya, Haik and Boloi. Local community gets drinking water by buying and from their wells. All rivers used as the source of water for sanitation and fishing ground are considered HCV 4 and 5 areas. Furthermore, there has been found several sites/areas of important cultural values such as sandung and sacred sites. These locations are individually controlled by local community. All of these cultural sites are considered important as HCV 6 areas.

Table 24. Summary of survey consultation for the Assessment's social field

| Expert/ Organisation/ Social Group	Name/ Position/ Relevant Role	Interaction Type	Comment and/ or Recommendation
Tumbang Kalang Village	Murdi (Head of Government Affairs)	Physical Meeting	• Tumbang Kalang is Dayak Ngaju community that has their own tradition. • Tumbang Kalang Village community leader is its village head, while the position of traditional leader is held by traditional chief; both are elected by community.

				• Sacred sites/areas are not found in PT TTL concession as they are located within settlement areas. • Tumbang Kalang Village area is mostly company and community plantations. Four oil palm plantation companies operate in Tumbang Kalang, i.e., PT TTL, PT KMB, PT BGUM and PT UL. • Before PT TTL clears lands, it should identify the land tenures. This is important to prevent land-related conflicts between community and the Company.
Sungai Hanya Village	Robi (Village Head)	Physical Meeting		• Many oil palms in PT TTL concession remain unmaintained. The Company should communicate with the village government about this. • Information dissemination event was once organised by PT TTL in 2010. Community was informed that partnership plantations would be developed on some parts of its concession. • Further information concerning PT TTL HGU concession should be disseminated to community, particularly relating to the Assessment. • Most of the village's area is currently company and community oil palm plantations. There are four oil palm plantation companies that operate in Sungai Hanya Village, i.e., PT KMB, PT TTL, PT BGUM and PT UL. • Sungai Hanya community still uses the river as their source of water for sanitation and transportation waterway. • Mixed rubber plantations (kelekak) are commonly found in Mentaya riparian area. However, they are controlled individually instead of through traditional rights. • Several sacred sites of Sungai Hanya community are located in PT PU concession. These should be identified and maintained.
Mulya Agung Village	Purwadi (Village Head)	Physical Meeting		• PT TTL should organise an advanced information dissemination event for community concerning its concession boundaries because community has many oil palm plantations in the Company's concession. • Several community members have claims over the same location in PT TTL concession. The Company should anticipate this by reidentifying land tenures. • The majority of Mulya Agung community currently earn livelihood from becoming oil palm smallholders and working in oil palm plantation companies. • Currently, most of the village area is company and community's oil palm plantations. There are four oil palm plantation companies that operate in Mulya Agungi.e., PT KMB, PT TTL, PT UP and PT UL • There is a sacred site in Mulya Agung, belonging to Dayak Ngaju community. They normally use it for rituals.
Tumbang Sepayang Village	Mahir L Mambay (Village Head)	Physical Meeting		• Traditional activities are still practiced by Tumbang Sepayang community, including marriage celebration, death ceremony, and birth celebration. However, they no longer use forest resources in performing the rituals. All materials used in the activities are obtained from buying and farmlands around their settlements. • Sacred sites/areas are in local settlements, none are in PT TTL concession. • Most of the community earn their livelihoods from becoming rubber and rice farmers. Rice farming activities have relatively decreased in the past 3 years due to the government regulation which prohibits the use of fire for land clearing. • There are three companies that operate in Tumbang Sepayang, i.e., PT KMB, PT TTL and PT UL
Tanjung Harapan Village	Sucipto (Village Head)	Physical Meeting		• Tanjung Harapan community welcomes PT TTL's plan to develop oil palm plantations but please pay attention to land tenure identification and land compensations. • This Assessment is important to the community. the Company management should engage the local community. • Most of Tanjung Harapan community earn livelihood from becoming oil palm smallholders. The village area has been entirely used for

			community and company oil palm plantations, as well as for settlements. • There are three plantation companies that operate in Tanjung Harapan, i.e., PT KMB, PT TTL and PT KUI.
Tumbang Boloi Village	Astono (Village Head)	Physical Meeting	• Most of Tumbang Boloi community earn livelihood from becoming oil palm and rubber smallholders. • Community considers that dissemination of PT TTL information much less than adequate. They are also not yet aware of the boundaries between PT KMB and PT TTL concessions. • Most of the village area is currently company and community oil palm plantations. There are four oil palm plantation companies that operate in Tumbang Boloi i.e., PT KMB, PT TTL, PT BA and PT UL.
Tumbang Bejanai Village	Yuliana (Village Head)	Physical Meeting	• Tumbang Bajenai community currently has no clear understanding of PT TTL concession boundaries, thus information on the boundaries should be disseminated. • Community expects that PT TTL provides the village government with CSR funds to allow them to create useful programmes for community. • There are three oil palm plantation companies that operate in Tumbang Bejenei, i.e., PT KMB, PT TTL and PT BA. In addition, some parts of the village are also cultivated by the community for oil palm and rubber plantations. • Today, the community no longer depends on forest. All life needs are met from buying. • Mentaya River is important as source of water for sanitation and fishing ground. • Most of the village area are already in the form of company and community oil palm plantations. There are four oil palm plantation companies that operate in Sungai Hanya, i.e., PT KMB, PT TTL, PT UP and PT UL
Luwuk Kuwan Village	Saturnus S. D. (Speaker of Village Council)	Physical Meeting	• While Community is open for PT TTL's planned oil palm plantation development, the Company management should directly communicate with the community concerning CSR fund management. • Luwuk Kuwan area is mostly company and community oil palm plantations. There are three companies that operate in Luwuk Kuwan, i.e., PT KMB, PT TTL and PT KIU. • Most of the community today no longer depends on the forest. Currently, their livelihoods are earnt from oil palm and rubber plantations. However, Mentaya River is important to the community as source of water for sanitation and fishing ground. • There are no sacred sites/areas in PT TTL concession. All sacred sites/areas are in the settlement. • Mixed rubber plantations (kelekak) are currently controlled individually. Decisions for these areas highly depend on those who control them
Agung Mulya Village	Surohman (Village Head)	Physical Meeting	• The Village Government expects that CSR programmes to be carried out in a transparent manner through village meeting mechanism. This way, the village could see the plan and budget allocated to them as an input for planning its development plan. • Most of the community earn their livelihoods from becoming oil palm smallholders. The village is entirely farmlands and settlements. • Agung Mulya's community is already familiar with oil palm plantation activities.
Rantau Tampang Village	Rudi Antonius (Village Head)	Physical Meeting	• Most of the community earn their livelihoods from becoming oil palm smallholders and working in oil palm plantation companies. • The use of natural resources, especially forest, is not found as there are no forests in Rantau Tampang Village. • Rantau Tampang Village is entirely used for farmlands and settlements. • There are three plantation companies that operate in Rantau Tampang PT TTL, PT KMB and PT BA.

			• Rantau Tampang community currently meet their life needs from buying and they are available year-round
Tumbang Mangkup Village	Eka Putra (Village Head)	Physical Meeting	• Tumbang Mangkup community are mostly oil palm and rubber smallholders. • Community welcomes the planned oil palm plantation development, however, before the developing plantation, the Company should identify land tenures and make compensations. • There are three companies that operate in Tumbang Mangkup, i.e., PT KMB, PT TTL and PT BA
Rantau Katang Village	Nuryadin (Village Head)	Physical Meeting	• Rantau Katang community is mostly oil palm smallholders. However, few people still have rice farming and rattan cultivation activities. • Currently they do not sell rattans as there are no buyers. The rattan areas are controlled individually and not traditional lands. • Community meets their life needs through buying. • There are three oil palm plantation companies that operate in Rantau Katang, i.e., PT TTL, PT BA and PT AWL
Beringin Agung Village	Toryanto (Village Head)	Physical Meeting	• The majority of Beringin Agung community earn their livelihood from becoming smallholder. They meet their life needs through buying. • There are no forest areas in Beringin Agung. The village is entirely used as farmlands and settlements. • Few community members still have rice farming activities, but their number has decreased since 2015 • There are two oil palm plantation companies, i.e., PT KMB and PT TASK 1.
Buana Mustika Village	Ahmat Muzali, SHI. (Village Head)	Physical Meeting	• Most of the community earn their livelihoods from working in plantation companies. They do not depend on forest to meet their life needs. Life needs are met through buying. • There are four oil palm plantation companies that operate in Buana Mustika, i.e., PT UP, PT KMB, PT TTL and PT TASK
Wonosari Village	M. Amin (Village Head)	Physical Meeting	• Most of the community earn livelihood from becoming oil palm smallholders and working in plantation companies. They do not depend on the forest to meet life needs. They meet their life needs through buying. • Some of Wonosari community are Dayak Ngaju ethnic group. They have sacred sites within their settlement area. • There are three companies that operate in Wonosari, i.e., PT KMB, PT TTL and PT HAL.
Bukit Makmur Village	Ujianto (Village Head)	Physical Meeting	• No forest areas are found in Bukit Makmur. The village area has been entirely converted into farmlands and settlements. • Most of the community earn livelihood from working in plantation companies. They do not depend on the forest to meet their life needs. They meet their life needs through buying. • There are three companies that operate in Bukit Makmur, i.e., PT KMB, PT TTL and PT UP.
Sebungsu Village	Yanter (Mantir Adat/ Asisstant to Dayak Chief)	Physical Meeting	• It would be best to conduct this Assessment before the Company develops oil palm plantation, but the community expects that this Assessment result to be communicated to them • Several historical and sacred areas/sites are in the settlements. No sacred sites are found in PT TTL concession. • Most of the community currently earn livelihood from becoming oil palm and rubber smallholders. None of them depend on the forest. • Sebungsu area is mostly company and community plantation area. There are five oil palm plantation companies that operate in the Sebungsu area, i.e., PT KMB, PT TTL, PT HAL, TASK 1, PT TASK 2, PT UP and PT SSP.
Agung Mulya Village	Dodi (Oil palm smallholder)	Physical Meeting	• Flood once occurred by Sebangan River. The level reached 2-3 m. • Sebangan River is a favourite fishing ground. Normally people catch Java barb, snakehead, rasbora and tilapia. • It is expected that river be clean from oil palm fronds that often block the river. Thickets on its banks should also be cleared.

Agung Mulya Village	David (PT KMB worker)	Physical Meeting	• If it rains for four days in a row, it will cause flood in Raya River. • The Middle part of Raya River has a floodgate that is no longer well maintained, making it difficult for the flood at oil palm plantation in the upstream area to go. • The floodgate was initially made to irrigate rice fields.
PT TTL	Nuryadi (PT TTL plantation assistant)	Physical Meeting	• Stacked fronds will be made to manage locations of oil palm plantation that often get flooded. • Flood in Ubai Besar River frequently takes place. If it rains over the night, normally it takes two days for the water to go. • There is a plan to construct embankments around Division 4 planting area to protect it from flood from Ubai Besar River.
Tumbang Boloi Village	Lade (Oil Palm smallholder)	Physical Meeting	• Mentaya River overflowed in April 2019. • Upstream of the Boloi River flows through SMNE Division 4. • Only 10% of Tumbang Boloi community use groundwater (drilled well), while the majority use water from Mentaya River. Boloi River is used for bathing and washing only when Mentaya water gets heavily cloudy.
Buana Mustika Village	Wahyudi, Ryan (Oil palm smallholder)	Physical meeting	• When it rains overnight in Buana Mustika, Sihi River will overflow, but the situation quickly goes back to normal. • Sihi River empties to Kaliman River. • Buana Mustika community sources or water are mostly drilled waters with depth of 15-25 m. • Sihi River no longer has fish, so that the community no longer fish in the river.
Tumbang Sepayang Village	Umel, Rabut, Rajuk (oil palm smallholder)	Physical meeting	• The majority of Tumbang Sepayang community use water from Mentaya River. They also have drilled wells with depth of 8-12 m. • It is expected that the Company provide clean water because Mentaya water gets heavily cloudy in rainy seasons
Sungai Hanya Village	Ibus (rubber smallholder)	Physical meeting	• The majority of Sungai Hanya community use water from Mentaya. • Sungai Hanya community does not use Hanya River because it gets polluted. • Pollution in Hanya River comes from PT BGUM's mill. Waste from PT KMB mill comes into Penyahuan River. • The Tempahas River was originally a lot of tapah fish originating from the Mentaya River • Monkey species are still commonly found in Hanya riparian area
Sungai Hanya Village	Kurisaman, Koya, Ifan, Aley (PT KMB workers)	Physical meeting	• Workers who live in quarters in PT KMB BBGE Division 2 (in the northern part of the MU area) use water from Tanggiran River because Hanya River already gets polluted
KPA 3 Bukit Beringin	Sunardi, Kiki, Aris (oil palm smallholders)		• Biru Lake water in Bukit Beringin never runs dry as it has a spring in it. • The water is crystal clear and looks blue from above. • Sometimes it is used for drinking water refill in dry seasons. • Biru Lake is part of upstream of Tempahas River.
Bukit Makmur Village	Ehen (logger)		• Haik River often overflows. • Haik empties to Sangsang. • Upstream of the Haik River flows in PT KMB oil palm plantation area
Tanjung Harapan Village	Dudi (fisher)		• Sangsang always overflows in wet seasons. • Many community members of Tanjung Harapan fish in Sangsang

Participatory mapping indicates that areas in the 17 villages are entirely controlled by individuals and companies, and no areas are found under communal, customary, or village control. Land uses in all villages are dominated by farmlands (**Map 8**) that consist of oil palm and rubber plantations, as well as mixed gardens. Some oil palm plantations are managed by local community, while others by oil palm plantation companies. All rubber plantations and mixed gardens are managed by local community. No community-managed secondary forest areas are found in the AoI. Rubber plantations situated in the AoI are intensive (non-traditional) gardens characterised by regular plant spacing and use of quality seeds. These rubber plantations are scattered along Mentaya riparian zone. Mixed gardens in the AoI are farmlands whose plants include rubber, fruits, rattans, and forest plants that are relatively diverse. These areas are formerly local community's farmlands that currently remain unmanaged.
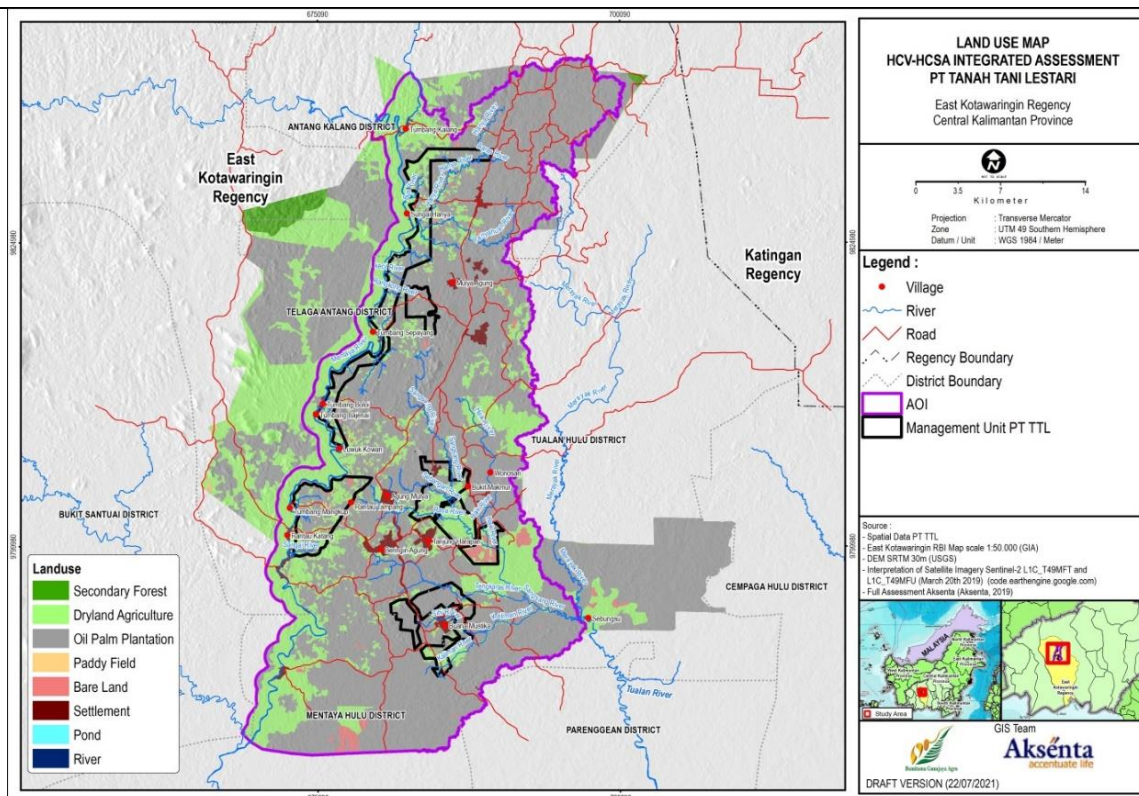
Map 8. Map of land uses in the AoI and its surroundings

FPIC status

Communication between the Company and local community and the Assessment team is already sufficient to meet all FPIC principles. This is a two-way communication, where the Company and the Assessment team always actively involve local community in joint decision-making process. During consultation with the local community, both the team and the Company deliver information in a fair manner regarding the project plan and the Assessment plan. The Assessment result will be subsequently presented again by the team to the local community to collect feedback.

Local community welcomes the presence of the Company and the Assessment team. They also participate in the Assessment process, assist the team to map land uses in the AoI. They find that the team could provide them with new knowledge concerning HCV and HCS in their areas. That being said, they have some points of concern: (i) they should be given time to review the Assessment output and discuss it with fellow community members so that they could reach an agreement regarding the development area proposed by the Assessment team; (ii) they suggest to identify land tenures before development by the Company, including areas proposed to become conservation areas; (iii) village governments and traditional council/*mantir* (traditional assistants) confirm that lands in PT TTL concession are controlled individually, which means that transfer of title will be subject to individual decisions; (iv) village governments confirms that the Company should transparently allocate CSR funds, relevant to what each village needs; (v) local community also confirms that partnership plantation as per government regulation should be developed simultaneously with the Company's own plantation.

HCV 4: Ecosystem services

HCV 4	Finding
Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.	**Present**

Managing extreme flow events, including vegetated riparian buffer zones or intact floodplains

Field indicator in the AoI that refers to this situation is water bodies (river, lake, swamp and their buffer zones) and currently well vegetated hilly areas. However, only rivers and their buffer zones, including swamps and their surrounding floodplains, are found in the MU area. There are around 32 rivers and tributaries in the MU area. The rivers' widths vary from 0.5 m to 8 m. Rivers with quite big width include Mentaya (outside the MU area), Hanya, Baras, Penyahuan, Konjat, Sangsang, Raya, Tengkaras and Haik. Most of these rivers and their riparian zones are currently in a good condition. Located by River Sangsang, swamp area in the MU functions as the river's flood buffer zone in wet seasons. Floodplains are found around River Tengkaras.

Maintaining downstream flow regimes

The presence of hilly areas that remain well vegetated in the upstream water catchment and swamp/lake areas in the middle part of it is the indicator of downstream flow regime maintenance. The MU area is located in the area where downstream major rivers flow, making the flow regimes are highly affected by the land condition and land uses/cover in the wider part outside the MU area. Forested and with deep solum, the upstream water catchment greatly contributes to the baseflow of River Hanya, Penyahuan, Rantian, Konjat, Sangsang, Raya, Tengkaras and Haik. The swamp in the middle of Sangsang flow also may potentially have groundwater seepage that contributes to the river's baseflow. Apart from that, the lake in the middle part of Raya flow plays the role as a retention basin that absorbs extreme water flow from the upstream part.

Maintaining water quality characteristics

Most of the riparian areas in the MU still have currently undisturbed natural vegetation, especially for the rivers that are quite big. The presence of the natural vegetation plays the role as natural filter against agrochemical pollution and materials from erosion to prevent them from entering the rivers.

Protection of vulnerable soils, aquifers and fisheries

All soil types in the MU area are mineral soils. Peat and marginal soils are not found. The soil textures are considered slightly fine (loam, sandy loam, to sandy clay loam). By soil hydrological group, they are considered group C whose infiltration rate is low. In such a condition, they play a relatively minimum role as groundwater recharging area that protects aquifers.

Provision of clean water

Three aspects must be met concerning clean water provision, i.e., good water quality, water availability and local community using the water. Rivers in the MU area that meet the three aspects are Tanggiran and Boloi used by Tumbang Boloi Village community.

Protection against winds, and the regulation of humidity, rainfall and other climatic elements

Function of protection against climatic elements is found in riparian zones naturally vegetated (shrub to forested land cover). Such natural vegetation contributes to the maintained stabilisation of microclimate in riparian ecosystems to allow support for aquatic biota life. Wind speed is at normal range and there has been no occurrence of strong wind. In the ground, no areas are found playing the role as windbreak or wind shelter such as cypress at the beach.

Natural ecosystems that play an important role in stabilising steep slopes

Steep slopes in the MU area are only found in the hilly area in its northern part, which is River Bus water catchment. This area has been converted into intensive oil palm plantations where terraces have been made, meaning that there has been changes in its natural ecosystems.

Pollination services

There are two indicators of pollination service in the AoI, i.e., the presence of community fruit plantations as the locations where pollinating agents (bee, bat, bird) work, along with the agents' habitats that take the form of currently sound forests around the plantations. Interview with the local community and field survey indicate that there is no community fruit plantation around the AoI. Most of the community use their lands for rubber and oil palm plantations and mixed garden. Fruit plantations are only found around village settlements outside located outside the MU.

Forests, wetlands, and other ecosystems which provide a protective barrier against destructive fires

Field indicators indicating the presence of firebreak as an ecosystem service include the sufficiently wide rivers or large wetland ecosystem. The Mentaya River meets this requirement and is located around the Assessment area, but outside the MU. Downstream of the Hanya River has sufficient width, but the vegetation around the riparian zone is very dense, so that fire can spread to the other side of the river through close vegetation canopies. Other rivers have relatively small widths so that they cannot serve as a protective zone to protect against destructive fires.

HCV 4 area size and locations in PT TTL MU area

The Assessment indicates that the HCV 4 areas in the ground take the form of rivers and their banks, as well as freshwater swamp. The total size of these HCV 4 areas is 225.9 ha and the HCV Management Area (**"HCVMA"**) is 422.6 ha distributed in 41 locations (**Map 9**). The swamp area accounts for only a small percentage compared to the size of the riverbanks and their floodplains.
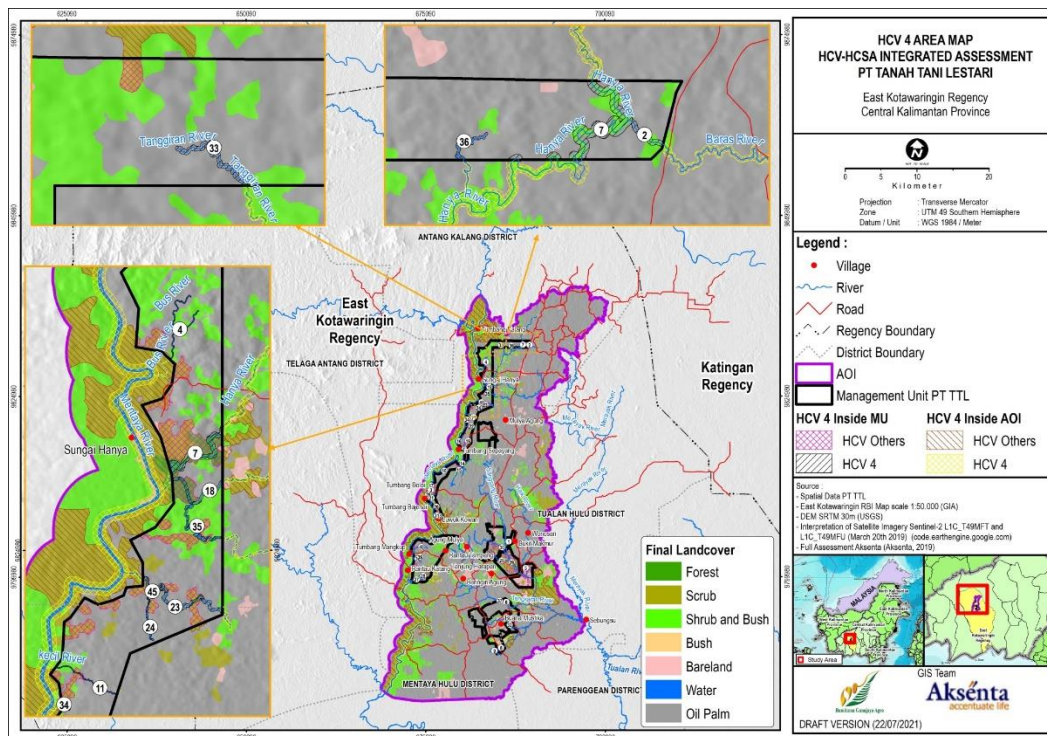
Map 9a. HCV 4 Areas in the AoI
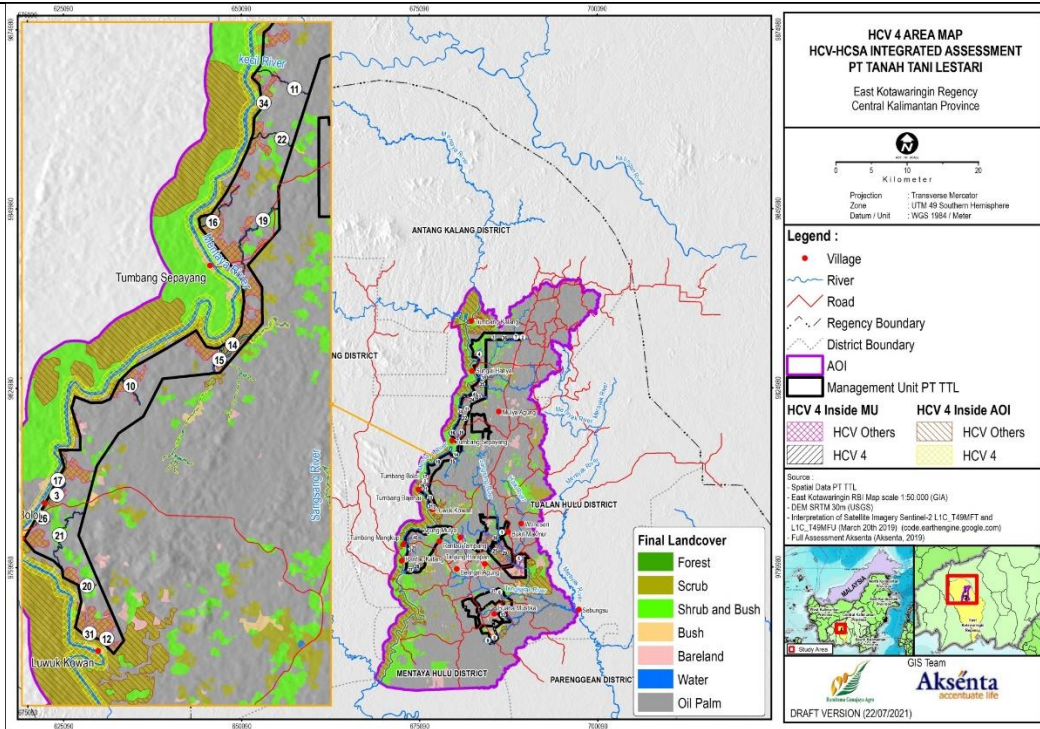
Map 9b. HCV 4 Areas in the AoI
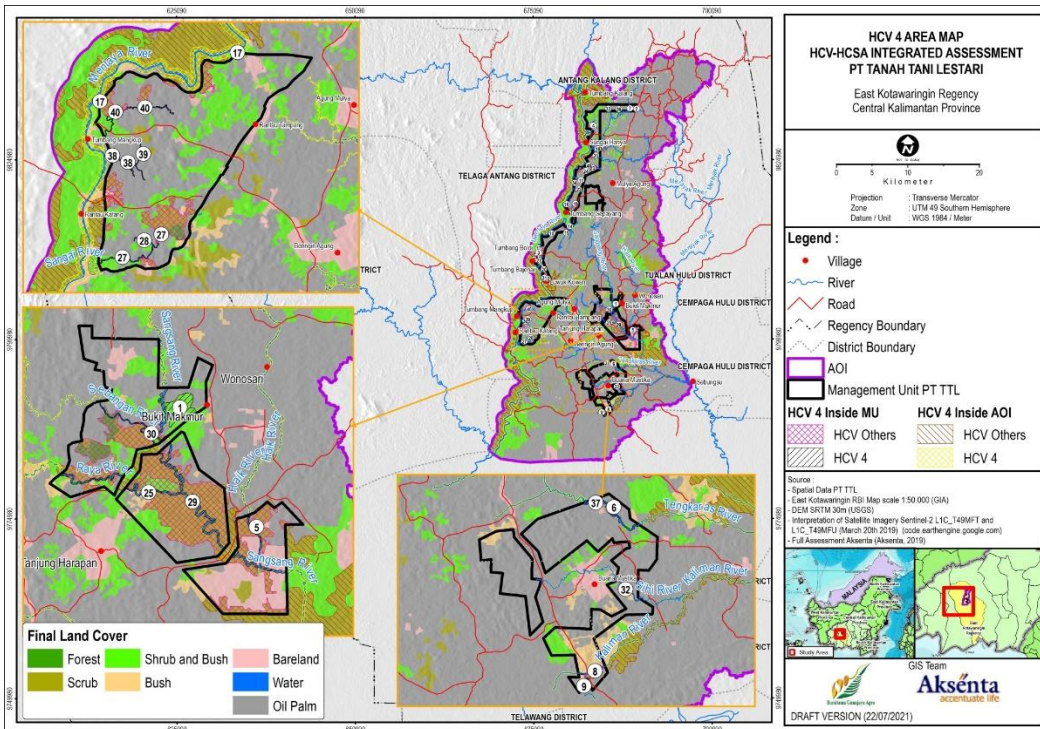
Map 9c. HCV 4 Areas in the AoI

HCV 5: Local Community Source of Livelihood

HCV 5	Finding
Sites and resources fundamental for satisfying the necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.	**Present**

HCV 5 indications in the Assessment area include local community fishing grounds and sources of water. The following are the full consideration of HCV 5 area presence:

Hunting and trapping ground

Local community has no specific hunting areas. Hunting is opportunistic and not specified in their customary law. Hunting and trapping are not their main livelihoods, as they do these only for recreation or hobbies and spare time. They normally hunt in oil palm and rubber plantations, as well as Mentaya riparian zone.

Non-Timber Forest Product (NTFP)

Currently, the local communities of 17 villages in the AoI do not use Non-Timber Forest Products (NTFP). They have long left behind NTFP use and currently no secondary forests are found in the villages. The villages have already been completely developed as permanent farmlands/plantations and settlements. Currently, several members of Dayak Ngaju community still cultivate rattans in rubber plantations and plan to convert their lands into oil palm plantations since rubber farming does not generate significant income and they cannot find buyers for rattans. As such, the presence of rubber plantations and rattans does not qualify as HCV 5.

Household fuels

Most of the local community currently use Liquefied Petroleum Gas (LPG) as the fuel for their households. However, few households are still using firewood for cooking. For firewood, they use rubber twigs that they can find in their plantations in the local villages or near their settlements. They use firewood as fuel, not because they cannot afford LPG cylinders, but rather because they want their foods taste better. No specific communal and traditionally protected locations are used to extract firewood.

Fish and freshwater species

Few members of local community, particularly those who live in native villages (Dayak Ngaju) still use rivers as their fishing ground. These rivers include Mentaya, Kojat, Sangsang, Sebangan, Raya and Haik. All of them are important to maintain because they are the source of livelihood to some of the local community members, hence they meet HCV 5 requirements.

Timber as building materials

Most needs for timber as building materials are met through buying. Local community logging activities are commercial activities instead of subsistent ones. These activities are commonly found in shrub areas in Mentaya riparian zone and a secondary forest in the northern part of the AoI. Local communities of the 17 villages in the AoI has no specific areas communally used for logging, protected by traditional law.

Fodder for livestock and seasonal grazing

Community has small-scaled animal farming activities around their house yards. They are not used to collect fodders from forest. Fodders from chickens and pigs are normally collected from family leftovers. As for cow fodders, these are obtained from oil palm and rubber plantations around their villages.

Source of water

Local community's needs for water are largely met from wells through buying. However, few families still use river water for sanitation activities such as bathing, toilet and washing. Rivers are used for sanitation by community include Mentaya, Tanggiran and Boloi. These rivers' presence is important to protect as they meet HCV 5 requirements.

Items which are bartered in exchange for other essential goods

Currently, no secondary forests are found in the 17 AoI villages as they are already used for farmlands and settlements. No forest items are found to be bartered for other essential items.

Rice fields (irrigated and non-irrigated) as source of food

Non-irrigated and irrigated rice fields are found in Rantau Tampang, Rantau Katang and Agung Mulya, while Tumbang Sepayang only has non-irrigated rice fields. The increasingly good road condition and income from oil palm creates the tendency to leave rice farming behind and shift to oil palm commodity. Community easily buys rice and other basic needs from local markets using the money they earn from working in companies, edible-nest swiftlet farming, rubber farming or sales of Fresh Fruit Bunch (FFB) yields. They also do not expect that these areas become conservation area. As such, irrigated and non-irrigated rice fields are not assigned HCV 5 area.

Meeting of local community's basic needs for healthcare

Local community no longer depends on traditional medicine. Every village has its own auxiliary clinics and village polyclinic with scheduled service from sub-district. Those who work in the Company can access its clinics. They can freely access medicines from local kiosks.

HCV 5 area size and locations in PT TTL MU area

The Assessment indicates that HCV 5 areas in the field take the form of rivers used for clean water and fishing. HCV 5 total area in PT TTL MU area is 102.2 ha and its HCVMA is 155.9 ha, distributed in nine locations (**Map 10**).
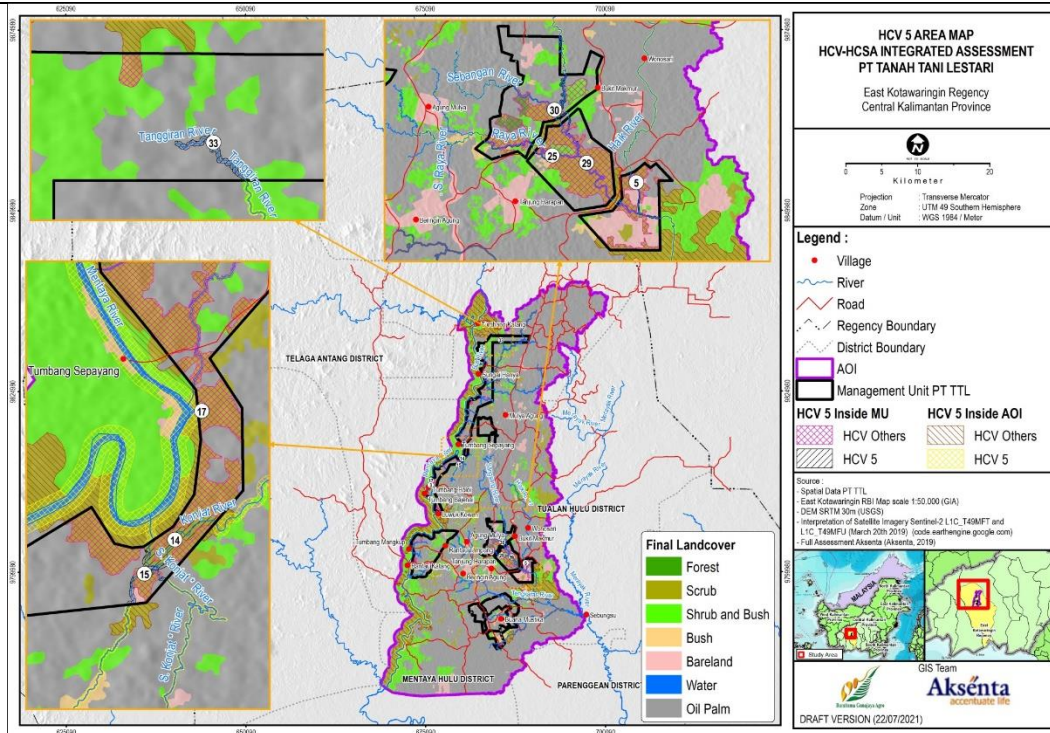
Map 10a. HCV 5 Areas in the AoI
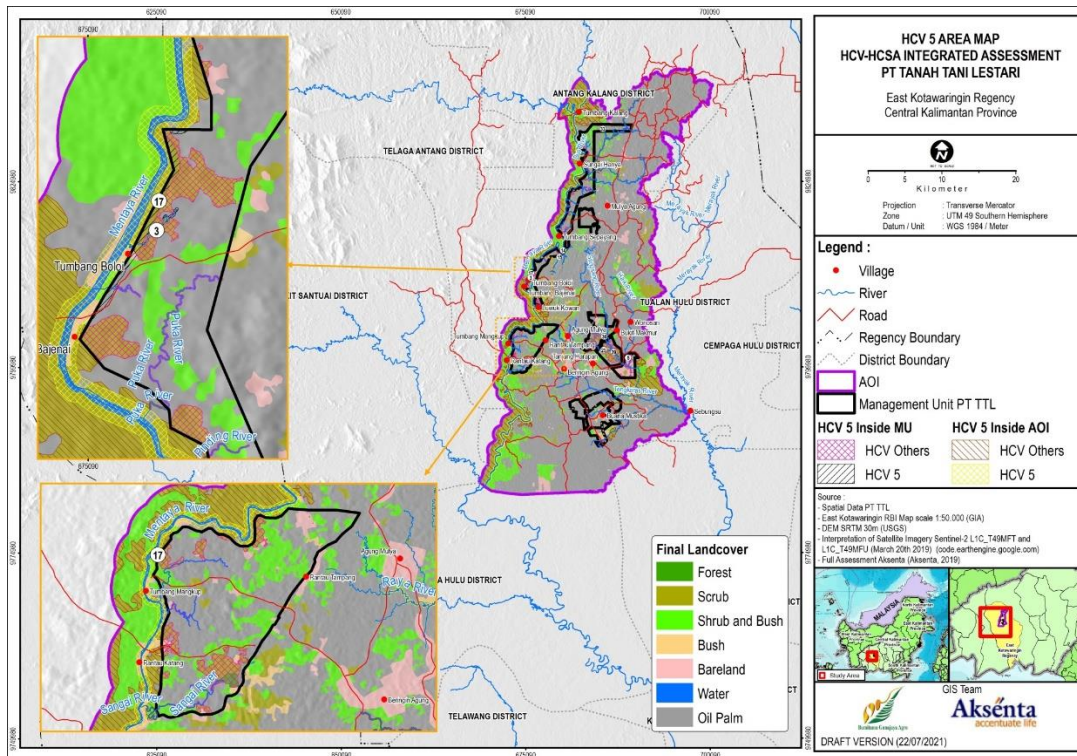
Map 10b. HCV 5 Areas in the AoI

HCV 6: Cultural values

HCV 6	Finding
Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.	**Present**

Sites recognised as having high cultural value within national policy and legislation

Sites recognised by national policies and legislations are found in the AoI, taking the form of *sandung*, *sepundu* and house of prayer in Sebungsu Village. All of them are of cultural values and sacred to the village community and are already registered as cultural reserve by the Minister of Education and Culture (2019).

Sites with official designation by national government and/or an international agency like UNESCO

No sites/areas with official designation by the Government or UNESCO are found in the AoI villages.

Sites with recognised and important historical or cultural values, even if they remain unprotected by legislation

Interaction is identified relating to sites with important historical and cultural values. According to the local community, there are *45anding*, burial grounds and sacred sites that are considered to have important historical and cultural values, hence they are important to conserve (**Map 11**).

Religious or sacred sites, burial grounds or sites at which traditional ceremonies take place that have importance to local or indigenous people

Community members who still embrace *Kaharingan* beliefs have sacred sites/areas used for rituals such as offering, wishing, and traditional ceremonies (**Map 11**).

Plant or animal resources with totemic values or used in traditional ceremonies

Dayak Ngaju community embracing *Kaharingan* beliefs still performs traditional ceremonies such as *tiwah, pakanan sahur, nahunan, nyanggar* and *pakanan batu.* All these activities use several plant species such as coconut, bamboo and other plant species. All of these resources are obtained from gardens in their settlement (house yards) or through buying. Community has no specific traditional law-protected areas to access these plants.

HCV 6 area size and locations

The *Assessment* indicates that HCV 6 area take the form of local community's historical and cultural sites. Total size of HCV 6 area and its HCVMA in PT TTL MU area is 0.2 ha (**Map 11**).
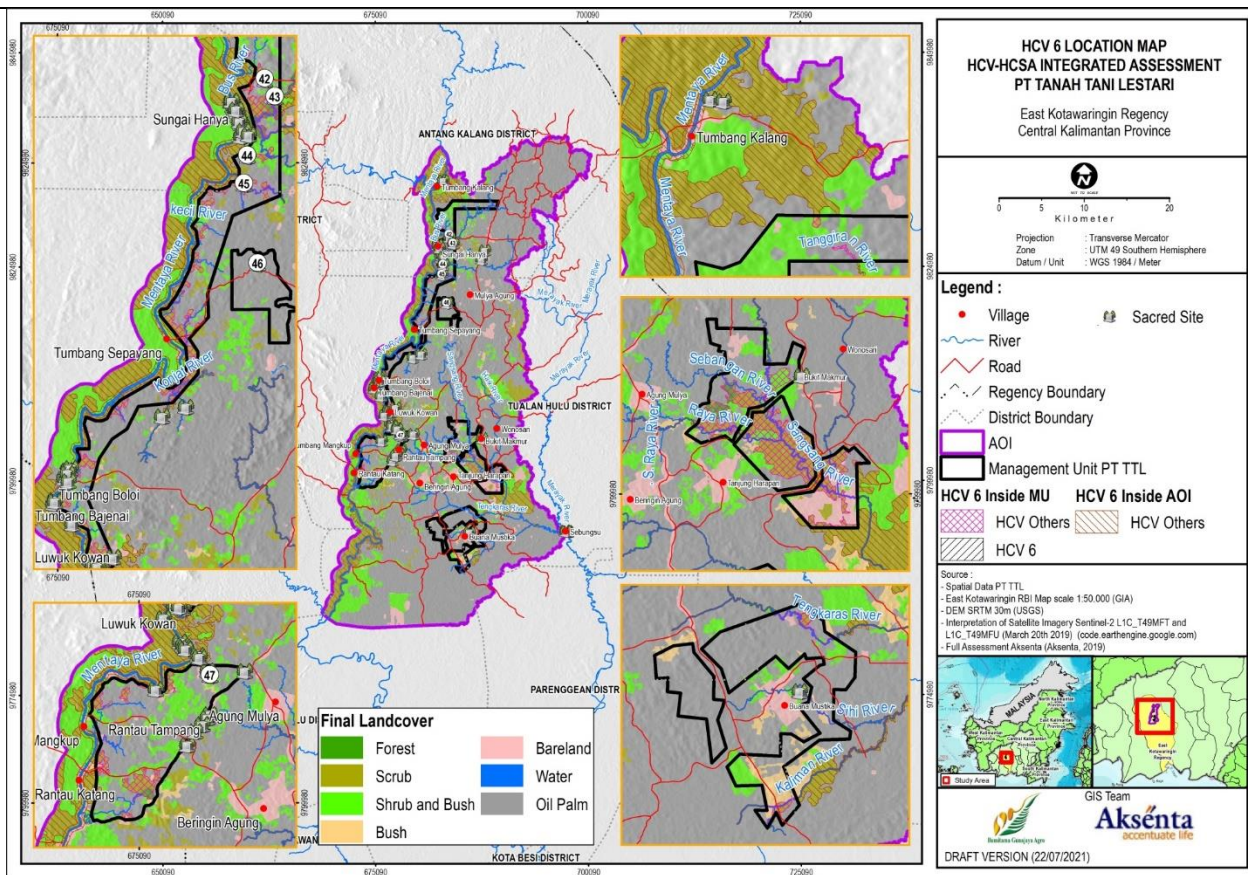
Map 11. HCV 6 Area in the AoI

Community areas and sources of future livelihood

None of the local community representatives from the 17 AoI villages sees future land use for food security is a problem. They earn livelihoods that are able to sustain their life, including working as oil palm plantation company workers, and becoming oil palm and rubber smallholders. Some of those who rely on their livelihood from becoming oil palm smallholders develop independent plantations and partner with PT TTL or other companies. Most local community needs are currently met through buying in local kiosks in their village settlements. They also easily buy food materials from peddlers and markets in the sub-district capital or nearby cities.

Total population of the villages that concern with the Company concession is 18,240 people. Assuming that each person needs 0.5 hectares, the total area required for guaranteeing their livelihood security in the future is 9,120 ha, while total area of these villages is 99,911 ha. Participatory mapping indicates that community's total area is 42,708.6 ha or about 4.7 times larger than the area they will need to secure their future livelihood.

From consultation with local community representatives, it is known that there are relatively large areas for oil palm and rubber plantations and mixed gardens. These areas may potentially be excluded from PT TTL's planned oil palm plantation development. Nonetheless, it is likely that the landowners will be willing to release their lands to the Company, provided that: (1) mutual agreement is reached by both parties upon the price; (2) community's plasma oil palm plantations are developed; and (3) there are clear CSR programmes for each village.

4.5.3. Environmental field: method and output

Environmental assessment method

Desktop study and secondary data review

Secondary data is collected from desktop review and information relevant to HCV 1-4 identification. Data and map concerning biodiversity and ecosystem are collected from various sources (Error! Reference source not found.). Land cover map is obtained through the interpretation of Landsat 8 Satellite image acquired on 22 November 2018 and Sentinel 2 image acquired on 8 February 2019 (both through www.earthexplorer.com), and Yandex Map hi-res image through SAS Planet. Secondary data is also collected for hydrological aspect assessment, soil study and peat assessment where relevant maps and data are used including Digital Elevation Model (SRTM 30 m), Indonesia Topographic Map, and the Company's rainfall and flood occurrence data, land system map (RePPProT, 1985), Ministry of Agriculture's peat map (Ritung *et al.*, 2011), Ministry of Environment and Forestry's KHG indicator map (Suwarno *et al.*, 2016).

Table 25. Documents and secondary data used in biodiversity assessment

No.	Source of Data and Information
1	IFL Map (Intacforest.org, 2017)
2	Key Biodiversity Area (KBA) http://www.keybiodiversityareas.org (2018)
3	Ramsar Site Distribution Map (wetland.org, 2018)
4	Borneo Ecoregion Map (wwf.org, 2012)
5	Borneo Orangutan Distribution Map (IUCN, 2017)
6	Kalimantan RePPProT, 1985
7	Forest Area Map (Conservation Forest and Protection Forest) (geoportal.menlhk.go.id)
8	RTE and IUCN species distribution Map (www.iucnredlist.org)
9	IUCN's Threatened Ecosystem Distribution Map (www.iucn.org)

Primary data collection

Forest inventory and biomass carbon stock estimation

Botanical survey for identifying tree species and carbon stock estimation (forest inventory) are carried out in the same data collection process. Data are collected using nested square plots (**Figure**). Each plot consists of four measurement sub-plots designed to assess stands in the plot by the DBH class.

Data collected in the survey plots include: (i) classification of land cover in the survey plot locations; (ii) substrate in the survey plot locations; (iii) GPS points of the survey plot locations; (iv) set of images in the survey plots (images represent four cardinal directions, soil and stand canopy cover); (v) species identification; and (vi) DBH of trees in the survey plots.

Vegetation structure and species composition analysis

Vegetation structure and species composition are identified through species domination as the parameter, along with their association to the stands of a land cover class. Species domination is identified through Important Value Index (IVI) of each species found in the survey plots based on the value of density, frequency and domination.
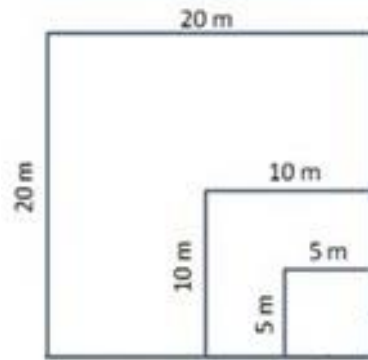
Figure 1. Botanical survey plot design

Carbon stock estimation

Stand biomass carbon stock is estimated using the DBH as the main variable. DBH is converted into biomass amount using tree biomass allometric equation. The allometric equation used in the Assessment is selected against the following criteria: (i) allometric equation specification by location and type of ecosystem in the Assessment area; (ii) allometric equation specification by the measured vegetation; and (iii) estimation accuracy measured against equation determination coefficients. The three allometric equation criteria used in the Assessment are assessed referring to the compiled biomass allometric equation models from the results of researchers all over the country (Krisnawati *et al.*, 2012). Upon the generation of biomass amount, the biomass carbon stock is calculated using coefficient 0.47 (IPCC, 2006).

Sample number and distribution

Number of samples is set through the following equation:

$$N = \frac{t^2 s^2}{E^2}$$

Where:

N	=	Number of samples;
t	=	Student's t-value;
s	=	standard deviation of the initial carbon stock amount distribution; and
E	=	possible deviation (expressed in percentage of initial carbon stock amount in average).

Number of samples is calculated using confidence interval of 95% and information on value diversity of land cover carbon stock in the Assessment area generated during the scoping study. Initial carbon data is collected through the plots as used in full assessment. Number and locations of initial carbon data collection prioritising areas with the most natural land cover class in the Assessment area. Based on calculation, 31 sample spots are required for natural land cover class, consisting of 21 spots for shrub and 10 others for thickets (**Table 26** and **Map 12**).

Table 26. Number of samples required

Land Cover	Carbon Average	Standard Deviation	n	k	Student's t-value	Number of sample	Number of sample (rounded)
Shrub	42.5	11.0	19	1	1.734	20.0	**21**
Thicket	39.6	6.5	8	1	1.895	9.8	**10**

Note: Initial carbon stock statistics is obtained on 27 measurement spots during scoping study (19 spots for shrub and 8 others for thickets)

In addition to botanical survey and estimation of carbon stock in natural land cover class, rapid observation is also carried out to verify other land cover classes. The number of observation points is not set systematically but based on number set evenly amongst the land covers. In this Assessment, rapid observation is carried out to 10 observation points for each non-natural land cover class (bush, barren soil and oil palm). Data collected in rapid observation includes description of land cover and dominant vegetation species found in the area in question.

HCV flora survey (outside measurement plot)

Flora species outside forest inventory measurement plots are surveyed to enrich data and information on: (i) vegetation structure and composition (indicator: complete tree stand canopy and species diversity); (ii) succession phase (indicator: initial phase, competition and reaction/advanced phase, stable/climax phase); and (iii) ecosystem quality (indicator: intact, relatively intact, slightly disturbed, disturbed, degraded, and severely degraded). Data and information from flora survey are also used to verify the output of analysis of land cover and landuse in wider landscape, and output of desktop study and secondary data review for initial hypothesis in assessing HCV 2 and HCV 3.

Fauna survey

Fauna species that this Assessment uses as indicators are limited only to mammal, bird and reptile taxa. The three taxa are selected because they are relatively easy to identify and sufficient as environmental quality indicators. See **Table** for the elaboration of the field data collection method.

Aquatic wildlife species are not surveyed because most of the AoI is situated in terrestrial ecosystem. In addition, mammal, bird and reptile taxa themselves are sufficient to consider as the proxy for protecting fauna habitats and riparian areas that support quality of river as habitat to aquatic species.

Table 27. Fauna survey method

Field Data Collection Approach	Identification		
	Mammals	**Bird**	**Reptile**
Habitat quality assessment	✓	-	-
Direct encounter (visual and audio)	✓	✓	✓
Indirect encounter (footprint/marks left)	✓	✓	✓
Vantage points	-	✓	-
Opportunistic observations	✓	✓	✓
Interview with local community	✓	✓	✓

Hydrological, soil and ecosystem service survey

Environment's physical components concerned with ecosystem services are surveyed, involving field observation and interview. All of the following objects are documented: (i) toponym; (ii) location description; (iii) current status (e.g., area condition, land use types and intensity); (iv) coordinate; and (vi) documented photography representing the field condition. Local community members who know the Assessment object are surveyed to enrich the information on the assessed objects. Ecosystem services (HCV 4) are assessed against the following field guide:

1) Identification of water body presence (swamp, river and lake) and their characteristics (river morphometric, flow regime and types).
2) Identification of river meanders and its characteristics (by source of stream bank) erosion, river sedimentation, oxbow lake and the current).
3) Defining riparian zones (boundaries and land cover).
4) Verification of water catchment (boundaries and land cover condition).
5) Water quality assessment by physical and biological proxy indicators (e.g., for the presence of aquatic invertebrates and vegetation species, colour and odour).

6) Identification of vulnerable soils, including sandy soils, low organic material, acid sulphate soils, or steep-slope soils.
7) Confirmation on community's sources of water (spring or seepage).
8) Assessment of microclimate by local physical condition, e.g., visio graphics, elevation, vegetation strata and soil type.
9) Identification of locations of community important plantations around the Assessment area.
10) Identification of pollination process (by wind, insects, birds, bats or others), and identification of habitats or locations of wildlife species around the Assessment area that contribute to the pollination (cave, limestone hill).
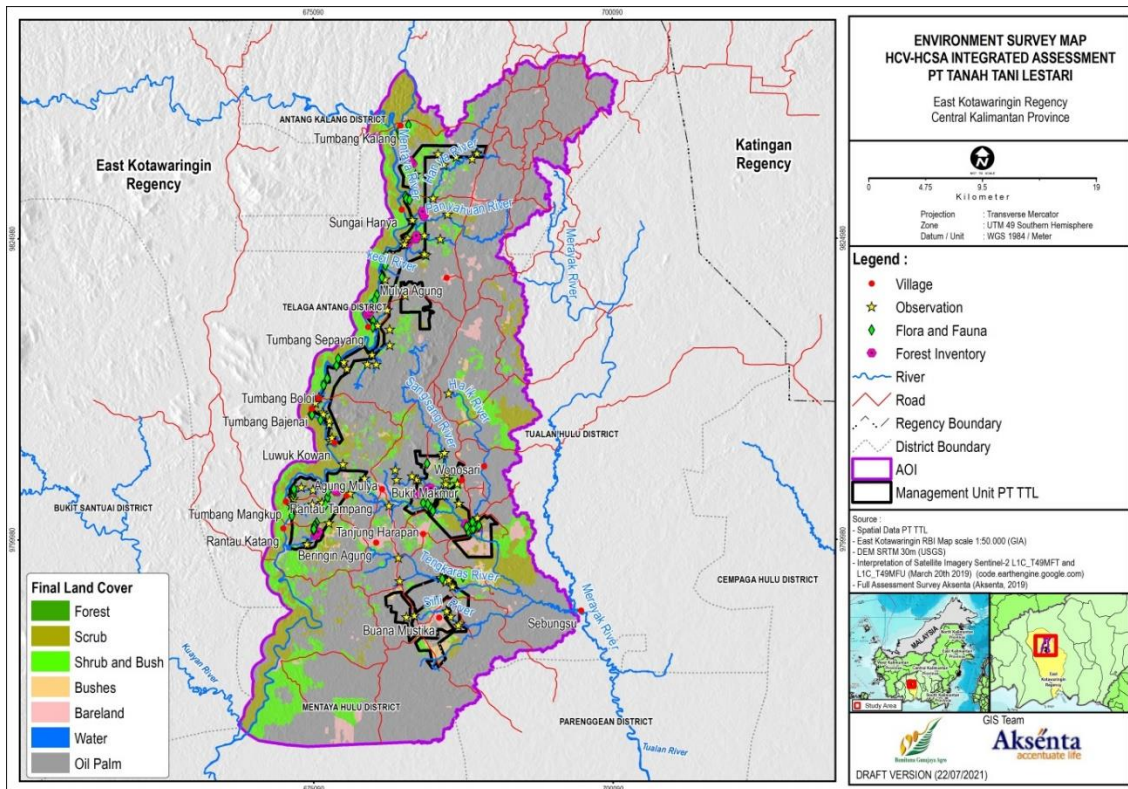
Map 12. Environmental sampling spots

Field activity output: summary of interview and discussion

Interview and discussion on environmental aspects are focused to explore information concerning with the overview of landscape change and RTE species presence. Respondents met include MU and local community members. The former includes sustainability staff and GIS surveyors who understand the history of land cover in the MU area and its surroundings. The latter includes those who know the land history and have frequent activities around and/or in the areas where natural vegetation covers remain (shrubs that may potentially be important areas to the biodiversity in this area and contain HCV and HCS, e.g., area of Bukit Makmur, Tumbang Boloi and Sungai Hanya Villages). Some of them are also hunters. Important output of the interview highlights that orangutan has no longer been encountered in the Assessment area since more than 10 years ago and that forests are no longer present in the area. See **Table 28** for complete output.

Table 28. Summary of interview and discussion

Expert/ organisation/ social group	Name/position/ relevant roles	Type of interaction	Comment and/or recommendation
MU	M. Vikki Arindi/ HO Sustainability Division	Discussion	Explaining the overview of the AoI landscape and boundaries, and neighbouring plantation companies. PT TTL environmental management is under PT KMB's.

Bukit Makmur Village community	Latok/ smallholder	Interview	Today, intact forests are no longer found in this area. Orangutan has no longer been sighted since the great fire in 1997. Sun bear footprint can still be found until few recent years. However, hunting activities are still much carried out around farm huts.
MU	Sosri/ GIS Surveyor	Interview	Orangutan has no longer been sighted since more than 10 years ago.
MU	Latif and Catur/EHS Division	Interview	Deer is once sighted in the MU area, around 2017. Once saw local community keep Bornean white-bearded gibbon and white belied sea eagle.
Sungai Hanya Village community	Rifak and Karli	Interview	About three months ago, they saw sun bear by Hanya River. They believe many of this species remain.
PT TTL worker	Sutoyo, Yadi and Gunawan/plantation workers	Interview	Bear can still be found in the Assessment area. There are three turtle species. If found, they will be cooked or kept. Currently, there are community members who consume any kind of meats. Orangutan is quite likely to be found remain in PT ABS concession. Pangolin is still present in Mentaya riparian area and shrubs in the northern part of Tumbang Kalang Village.
Tumbang Boloi Village community	Yettri/PT KMB's PR	Interview	Mammal species that are still found around the Assessment area include *ingker*, *rusa*, *buhis* and *bekara*. Bornean white-bearded gibbon was lastly found two years ago. Community uses ironwood for house construction materials and swiftlet farm building.
Luwuk Kowan Village community	Rudiyanto/ smallholder	Interview	Encounter with sun bears (mother and cubs) around two years ago in Sungai Hanya Village. Primates that are still found are maroon leaf monkey and long-tailed macaque.

HCS classification and carbon assessment

a. Strata description

1. *Forest.* It is dominated by rubber trees (*Hevea brasiliensis*) and pioneer trees such as fig (*Ficus* sp.), *nyatoh merah* (*Palaquium quercifolium*), and *mahang* (*Macaranga gigantea*). Based on the dominant tree species, there is strong indication that the forest had been suffering from human disturbance. Forest has 97.4 tonnes C/ha of carbon stock potential and is the largest among other land cover types. Forest is the most natural land cover class in the MU and has the highest species diversity.

Utara

Timur

Selatan

Barat

Kanopi

Substrat

Figure 2. Condition of forest coverage

2. *Shrub*. It is dominated by rubber trees *(Hevea brasiliensis)* that are the main plant species in community plantation management and marking. Shrubs are considered a relatively more natural land cover class in the MU as it has high species diversity at sapling level (DBH 2-10 cm), pole level (DBH 10-20 cm) and tree level (DBH >20 cm). At tree level, association of dominant species found other than rubber includes pioneer tree species, i.e., *laban (Vitex pinnata)*, *nyatoh putih (Palaquium dasyphillum)*, *nyatoh merah (Palaquium quercifolium)* and *terap (Artocarpus elasticus)*. Shrub has the potential as natural land cover with the carbon stock (54.8 tonnes C/ha). In HCS land cover classification, shrubs in the MU area are identified as one of the HCS land cover classes, i.e., young regenerating forest.

North   East   South

West   Canopy   Substrate

Figure 3. Condition of shrub coverage

3. *Thicket*. It is dominated by rubber trees *(Hevea brasiliensis)*. It has been confirmed that these areas are lands once used for community plantations. Dominant tree species association includes rubber trees and pioneer species, i.e., *Vitex pinnata*, *mahang (Macaranga hypoleuca)*, *nyatoh merah (Palaquium quercifoliumium)* and rambutan hutan/merakiang *(Dimocarpus fumatus)*. Thicket land cover's carbon amount is 16.1 tonnes C/ha. In HCS land cover classification, thicket is identified as scrub which is a HCS land cover.

Utara   Timur   Selatan

Barat   Kanopi   Substrat

Figure 4. Condition of shrub coverage

4. *Bush*. This takes form of lands recently cleared and yet covered by sapling, pole and tree-levels vegetation. Dominant plant species found in bush is grass. However, in certain locations, bamboo and abandoned oil palms can also be found in bush-covered areas. In HCS land cover classification, bush in the AoI belong to 'open land' category. As it has no significant amount of land cover plant biomass, it is not categorised under potential HCS land cover class.

North

East

South

West

Canopy

Substrate

Figure 5. Condition of bush coverage

5. *Baren soil*. This land class has no vegetation cover. Barren soils takes the form of developed areas such as settlement, infrastructure, plantation developed area, etc. In HCS land cover classification, it falls under built-up area category. It is not considered HCS land cover category.

Plantation developed area

Settlement

Figure 6. Barren soil class coverage

6. *Oil palm*. This takes the form of company and community's oil palm plantation blocks. It is not considered natural land cover class either. In HCS land cover classification, oil palms are considered Agri/Agricultural Estate category.

Company oil palms

Community oil palms

Figure 7. Oil palm class coverage

b. Estimated area per vegetation stratum

Table 29. Area by cover classification

Land Cover	(ha)	Percentage (%)
Potential HCS		
Forest	174.7	1.6
Young regenerating forest	1,789.2	16.1
Sub-total HCS	1,963.9	17.7
Non-potential HCS		
Scrub	1,912.7	17.3
Open Land	271.9	2.5
Built-up land	467.2	4.2
Agricultura estate	6,463.7	58.3
Sub-total non-potential HCS	9,133.79	82.4
Total	11,079.4	100.0

c. Vegetation stratification map
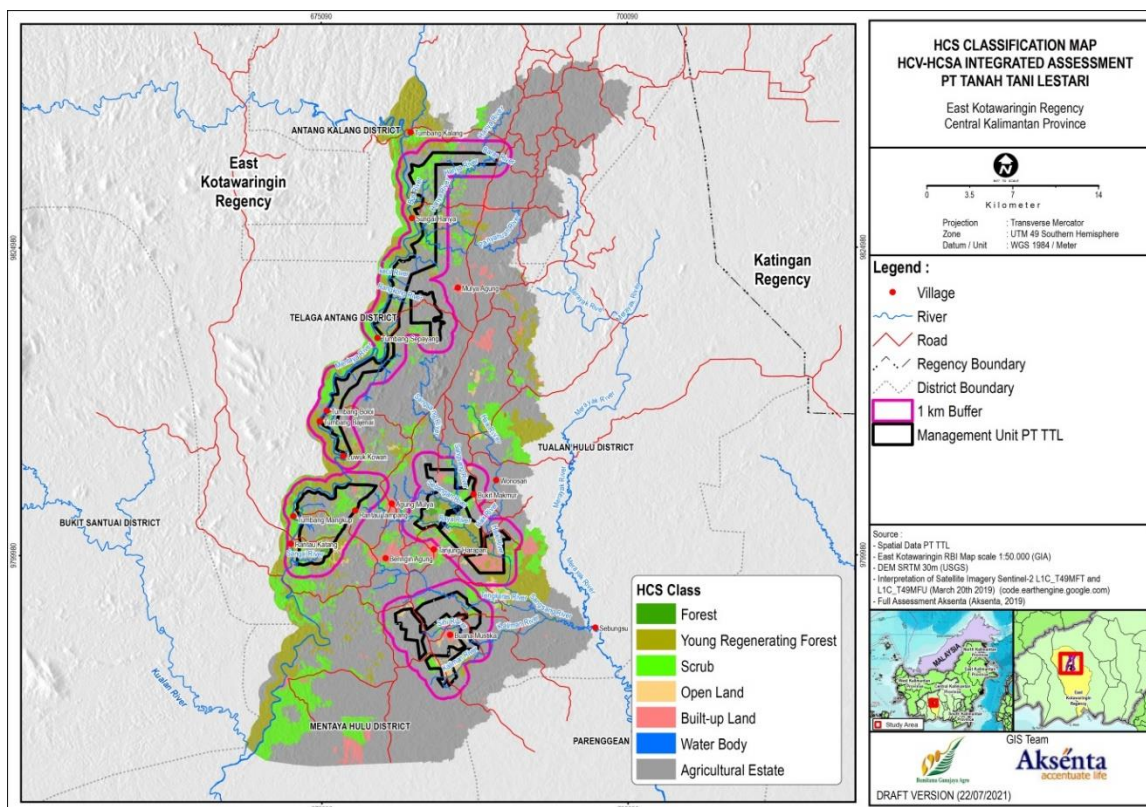
Map 13. Map of vegetation stratification (HCS cover class) in the Assessment area

d. Estimated land cover carbon stock at plot scale

Table 30. Carbon stock estimation by land cover classification

Land Cover	(ha)	Plot	Carbon Average (tonC/ha)	Standart error	Confidence Level (90%) Lower (tonC/ha)	Confidence Level (90%) Upper (tonC/ha)	Total Carbon (tonC)
Potensi HCS							
Forest	174.7	9	97.4	4.3	89.4	105.4	17,015.8
Young regenerated forest	1,789.2	16	54.8	3.2	49.1	60.4	98,048.2
Non-potential HCS							
Scrub	1,912.7	6	16.1	5.2	5.5	26.7	30,794.5
Open Land	271.9	-	-	-	-	-	-
Built up Land	467.2	-	-	-	-	-	-
Agricultural Estate	6,463.7	-	-	-	-	-	-

e. Statistical analysis of carbon stock inventorying

In this Assessment, there are two land cover classes that require forest inventorying activities as part of land cover and carbon stock classification process. Although only two classes are tested, Scheffe Test keeps going on as part of the procedure that must be met. ANOVA test indicates points out a significant difference between the average carbon stocks of shrub and thicket land cover classes (F calculation > F confidence level). The Scheffe test also indicates the

similar output (pairwise difference > Scheffe Comparison Value). Therefore, conclusion is drawn that the land cover and carbon stock classification meets the requirement with confidence level 95% (

Table 31 and **Table 32**).

Table 31. ANOVA test towards YRF and Sc

Source	SS	Df	MS	F	P-value	F_90% CL	Significance
Between Groups	24,587.2	2	12,293.6	74.4	0.0	2.5	Significant
Error	4,625.7	28	165.2				-
Total	2,9213.0	30	973.8				-

Table 32. Scheffe analysis towards FOR, YRF and Sc

Variables	N	SS	Avg
FOR	9	2236.6	97.4
YRF	16	2049.6	54.8
SC	6	339.5	16.1
	SSE	4625.7	
	MSE	165.2	
	p	0.1	
	k	3.0	
	N	31.0	
	F(p,k-1,N-k)	2.5	
Pair Wise Difference			
Type	FOR	YRF	SC
FOR		42.7	81.3
YRF			38.6
SC			
Scheffe Comparison Values			
Type	FOR	YRF	SC
FOR		12.0	15.2
YRF			13.8
SC			
Scheffe Comparison Values			
Type	FOR	YRF	SC
FOR		Significantly Different	Significantly Different
YRF			Significantly Different
SC			

HCV 1: Species diversity concentration

HCV 1	Finding
Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.	**Present**

Based on data collection, the number of species indicating biodiversity in the AoI is 307 species that include 195 flora and 112 fauna species. In fauna group, there has been recorded 73 bird, 23 mammal and 16 reptile species. By conservation and protection status of all of the flora and fauna species, there has been recorded 22 endemic species, 27 RTE species and 15 others protected species. In addition, 19 species are listed under CITES Appendix. See **Table 33** for detail on important flora and fauna for conservation documented in this Assessment.

Table 33. RTE fauna and flora species recorded in the AoI

No	Latin Name	Indonesian Name	Status				Data Type
			R	IUCN	CITES	Law	
Bird							
1	*Elanus caeruleus*	Elang tikus	<	LC	II	p	Direct
2	*Spilornis cheela*	Elang-ular bido	<	LC	II	p	Direct
3	*Nisaetus cirrhatus*	Elang brontok	<	LC	II	p	Direct
4	*Microhierax fringillarius*	Alap-alap capung	<	LC	II	p	Direct
5	*Anthracoceros malayanus*	Kangkareng hitam	<	VU	II	p	Direct
6	*Lonchura fuscans*	Bondol Kalimantan	E	LC	n/l	n/p	Direct
7	*Acridotheres javanicus*	Kerak kerbau	<	VU	n/l	n/p	Direct
Mammals							
8	*Presbytis rubicunda*	Lutung merah	E	LC	II	p	Direct: rare
9	*Presbytis frontata*	Lutung dahi putih	E	VU	II	p	Info: rare
10	*Macaca nemestrina*	Beruk	<	VU	II	n/p	Info: rare
11	*Helarctos malayanus*	Beruang	<	VU	II	p	Footprint
12	*Aonyx cinereus*	Sero ambrang	<	VU	II	p	Info: rare
13	*Prionailurus bengalensis*	Kucing hutan	<	LC	II	p	Direct; many
14	*Sus barbatus*	Babi janggut	<	VU	n/l	n/p	Info: very rare
15	*Rusa unicolor*	Rusa	<	VU	n/l	p	Rare; very rare
16	*Nasalis larvatus*	Bekantan	E	EN	II	p	Info: outside the MU
17	*Hylobates albibarbis*	Owa kalawit	E	EN	I	p	Info: outside the MU
18	*Nycticebus menangensis*	Kukang	<	VU	I	p	Info: outside the MU
19	*Cephalopachus bancanus*	Mentilin	<>	VU	II	n/p	Info: outside the MU
20	*Manis javanica*	Trenggiling	<>	CR	II	p	Info: outside the MU
Reptilia							
21	*Python reticulatus*	Ular sawah	<>	LC	II	-	Info: rare
22	*Naja sumatrana*	Ular sendok	<	LC	II	-	Footprint
23	*Amyda cartilaginea*	Bulus/Lelabi	<	VU	II	-	Info: very rare
24	*Siebenrockiella crassicolis*	Kura lumpur	<	VU	-	-	Direct; rare
Flora							
25	*Popowia odoardi*	Pisang-pisang	E	n/a	n/l	n/p	Direct
26	*Santiria megaphylla*	Seladah batu	E	LC	n/l	n/p	Direct
27	*Calophyllum castaenum*	Nyatoh	E	n/a	n/l	n/p	Direct
28	*Garcinia beccarii*	Kandis	E	n/a	n/l	n/p	Direct
29	*Dillenia borneensis*	Simpur	E	VU	n/l	n/p	Direct
30	*Anisoptera marginata*	Mersawa	<	EN	n/l	n/p	Direct
31	*Dipterocarpus caudiferus*	Keruing	E	NT	n/l	n/p	Direct
32	*Dipterocarpus crinitus*	Keruing	<	VU	n/l	n/p	Direct
33	*Dipterocarpus hasseltii*	Keruing	<>	EN	n/l	n/p	Direct
34	*Dipterocarpus kunstleri*	Keruing	<	CR	n/l	n/p	Direct
35	*Dipterocarpus tempehes*	Keruing	E	CR	n/l	n/p	Direct
36	*Shorea gibbose*	Meranti	<	CR	n/l	n/p	Direct

| 37	*Shorea laevis*	Bangkirai	<	VU	n/l	n/p	Direct
38	*Shorea pauciflora*	Meranti	<	EN	n/l	n/p	Direct
39	*Shorea pinanga*	Tengkawang	E	n/a	n/l	n/p	Direct
40	*Vatica oblongifolia*	Resak	E	VU	n/l	n/p	Direct
41	*Albizia rosulate*	Jering hutan	E	n/a	n/l	n/p	Direct
42	*Fordia splendidissima*	Biansu	E	n/a	n/l	n/p	Direct
43	*Endiandra elongata*	Medang	E	n/a	n/l	n/p	Direct
44	*Eusideroxylon zwageri*	Ulin	<	VU	n/l	n/p	Direct
45	*Horsfieldia borneensis*	Kumpang	E	VU	n/l	n/p	Direct
46	*Knema pallens*	Mendarahan	E	n/a	n/l	n/p	Direct
47	*Syzygium elliptilimbum*	Ubah	E	n/a	n/l	n/p	Direct
48	*Baccaurea edulis*	Tampoi	E	n/a	n/l	n/p	Direct
49	*Lepisanthes divaricata*	Kekepal	E	n/a	n/l	n/p	Direct

Note:
R: distributed; E: endemic; <: Borneo, Java and Sumatera; >: Sulawesi and eastern region; IUCN: International Union for Conservation of Nature; CR: Critically Endangered; EN-Endangered; VU-Vulnerable; LC-Least Concern; n/a-not available (no data available); CITES: The Convention on International Trade of Endangered Species; II: listed on Appendix II; n/l: not listed; Law: Indonesian protection laws and regulations; p-protected; n/p-not protected.

In general, the biodiversity around the UM (and the AoI) is much lower than that in the area of biodiversity centres around it (e.g., Sebangau National Park). As an illustration, the number of mammal species recorded in the AoI is only about 30% of that in Sebangau National Park, and its flora species is only 24% of that in the national park (Sebangau National Park, 2014). However, the presence of HCV species is still recorded in the Assessment area. Endemic species in the AoI include maroon leaf monkey *(Presbytis rubicunda)*, white-fronted surili *(Presbytis frontata)*, Proboscis monkey *(Nasalis larvatus)*, Bornean white-bearded gibbon *(Hylobates albibarbis)*, and *Dipterocarpus tempehes*. RTE species include Sunda pangolin *(Manis javanica)* with CR status, sun bear *(Helarctos malayanus)* with VU status, *Dipterocarpus tempehes* and *Shorea gibbosa* with CR status. Protected species include primate, large mammal, hornbill and bird of prey groups. Considering the presence of endemic, RTE and nationally protected species, HCV 1 requirements are considered to be met.

Important areas take the form of the remaining forest and shrub fragments, distributed in several locations, as well as rivers and their riparian areas (**Map 14**). The total HCV 1 area is 1,842.1 ha and the HCVMA is 2,095.9 distributed in 41 locations. HCV 1 areas' indicative boundaries are set based on key species (RTE, endemic and protected species) presence and their habitat requirement.
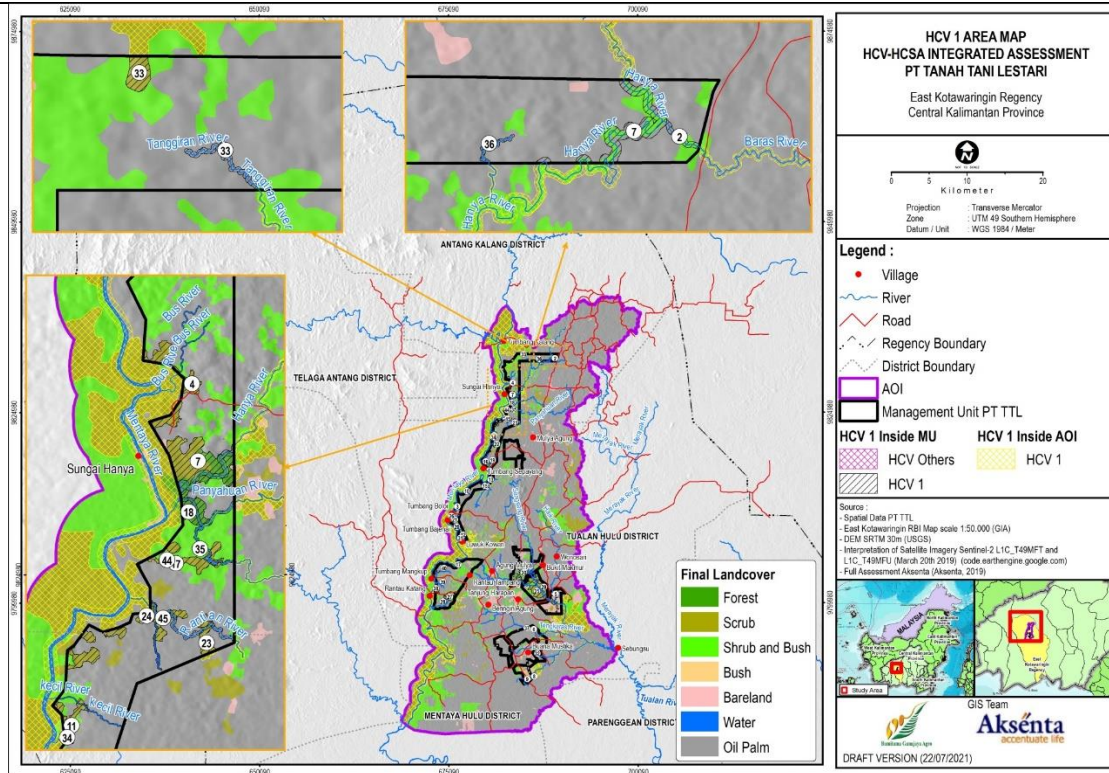
Map 14a. Map of HCV 1 areas in the AoI
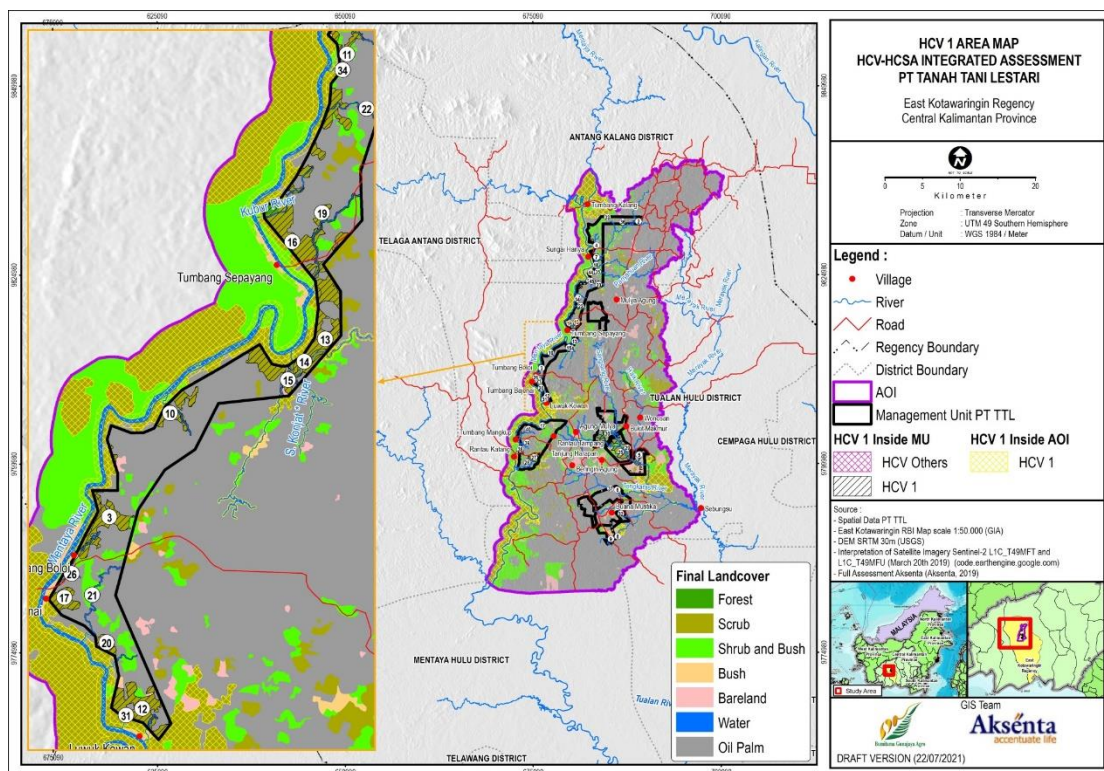
Map 14b. Map of HCV 1 areas in the AoI
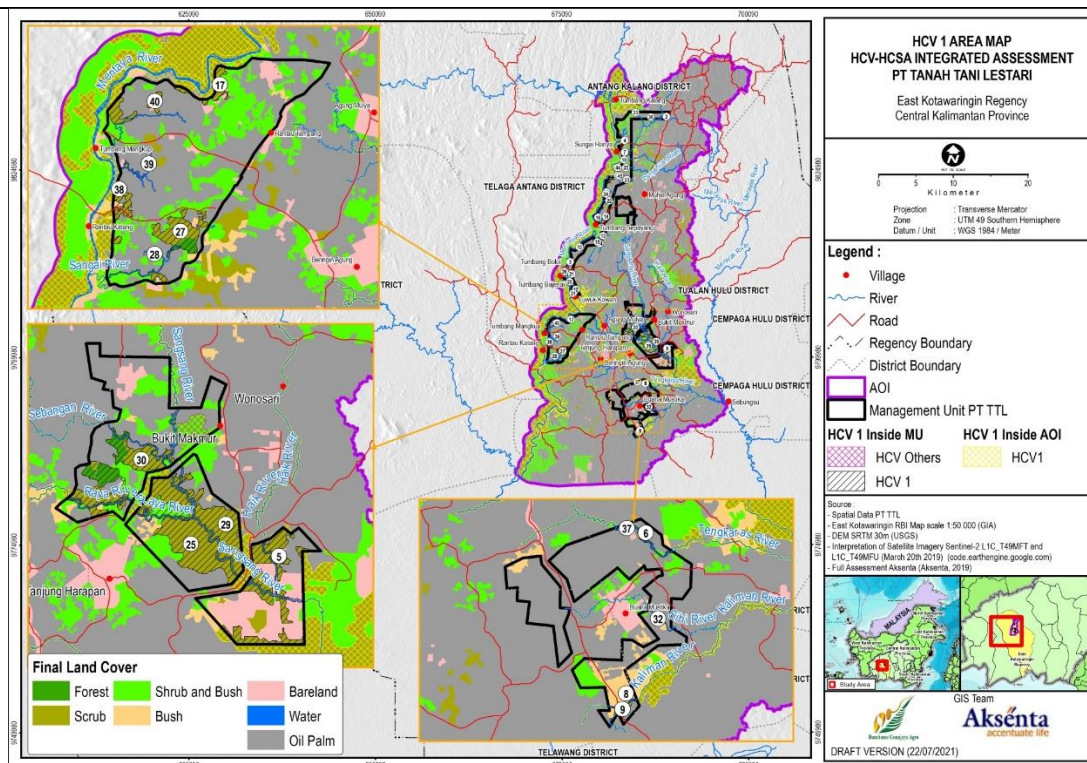
Map 14c. Map of HCV 1 areas in the AoI

HCV 2: Large landscape

HCV 2	Finding
Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.	**Absent**

Based on map analysis and field observation, it is concluded that no HCV 2 areas are found in the Assessment area because of the following conditions: the AoI is situated far outside IFL as the major indicator of the presence of intact forests with significant area within landscape-scale (the nearest distance to the IFL is above 50 km); the AoI is outside and is quite distant from conservation area (the nearest distance is around 50 km to Bukit Baka Bukit Raya National Park); the AoI and its surroundings are currently dominated by oil palm and rubber plantations (cultivation areas); the remaining shrub fragment in the AoI is the major source of timber to the community within the AoI; none of the existing shrub fragments functions as stepping stone, buffer zone and/or connector to large natural ecosystems surrounding them because no natural ecosystems remain within and around the AoI; and the remaining natural ecosystems at the landscape level have already been degraded and fragmented, not giving enough opportunity to a species to have sufficient population.

HCV 3: Rare ecosystem

| HCV 3	Finding
Rare, threatened, or endangered ecosystems, habitats or refugia.	**Present**

HCV 3 is identified based on precautionary approach according to the HCV Toolkit for Indonesia 2008 and referring to the Common Guidance for the Identification of HCV for determining threatened ecosystem types. Ecosystem types are determined based on RePPProT land system map (1985) and WWF Ecoregion Map (2010). Map analysis indicates the

presence of natural ecosystem, namely Lowland Dipterocarp Forest and Heath Forest Ecosystem, in the AoI. Verification through land cover classification and environmental aspects assessment indicates that Heath Forest Ecosystem can no longer be found in the AoI because the areas identified to potentially have Heath Forest Ecosystem no longer have natural cover (they have currently been converted into oil palms), while it has been confirmed that Lowland Dipterocarp Forest as natural ecosystems are still present in several parts of the AoI. Based on assessment of physical aspects and land cover, it is known that Lowland Dipterocarp Forest Ecosystem in the AoI can be divided into three, i.e., Riparian Forest Ecosystem, Dryland Lowland Forest Ecosystem, and Freshwater Swamp Forest Ecosystem. Riparian Forest Ecosystem is identified having criteria of natural land cover (shrub) that remains in the AoI, distributed in riverbanks with hydrological function as riparian areas. Dryland Lowland Forest Ecosystem is identified with the criteria of natural land cover outside riparian areas and it has relatively intact forms and size. Freshwater Swamp Forest Ecosystem is identified with criteria of natural land cover in swamp area. It is found by Sangsang River. Other small fragments of shrub whose locations are distributed in the AoI are not considered natural ecosystems as they tend to have been severely degraded and posing high risk of damage. Based on HCV Toolkit for Indonesia and Common Guidance, Lowland Mixed Dipterocarp Forest ecosystem is declared to qualify as HCV 3, considering that: the ecosystem meets the requirements as ecosystem and habitat; it may potentially function as refugia; it is considered a rare/threatened ecosystem; and it falls under the category of productive stands based on Minister of Forestry Decree Year 2001 on Shrub Land Cover.

The Assessment indicates that HCV 3 areas in the field take the form of Mixed Dipterocarp Forest Ecosystem in terrestrial forest and shrub fragments, forest and shrub in riparian areas and currently naturally vegetated swamp ecosystems. The total HCV 3 area is 1,897 ha distributed in 32 locations (**Map 15**).

Peat

Peats are not found in the AoI. Based on several reference maps, the nearest KHG from the AoI is approximately 20 km south by downstream of the Mentaya River. This area includes Mentaya-Tualan KHG, Mentaya-Cempaga KHG, Katingan-Mentaya KHG and Mentaya - Sampit KHG.
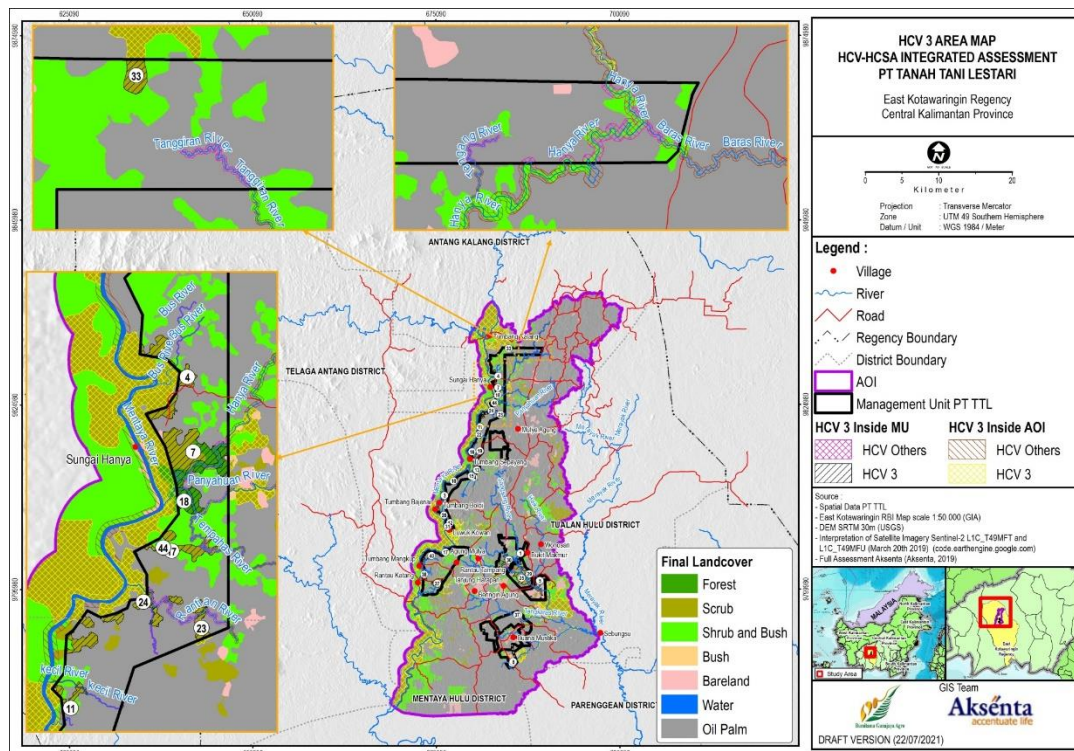
Map 15a. Map of HCV 3 areas in the AoI
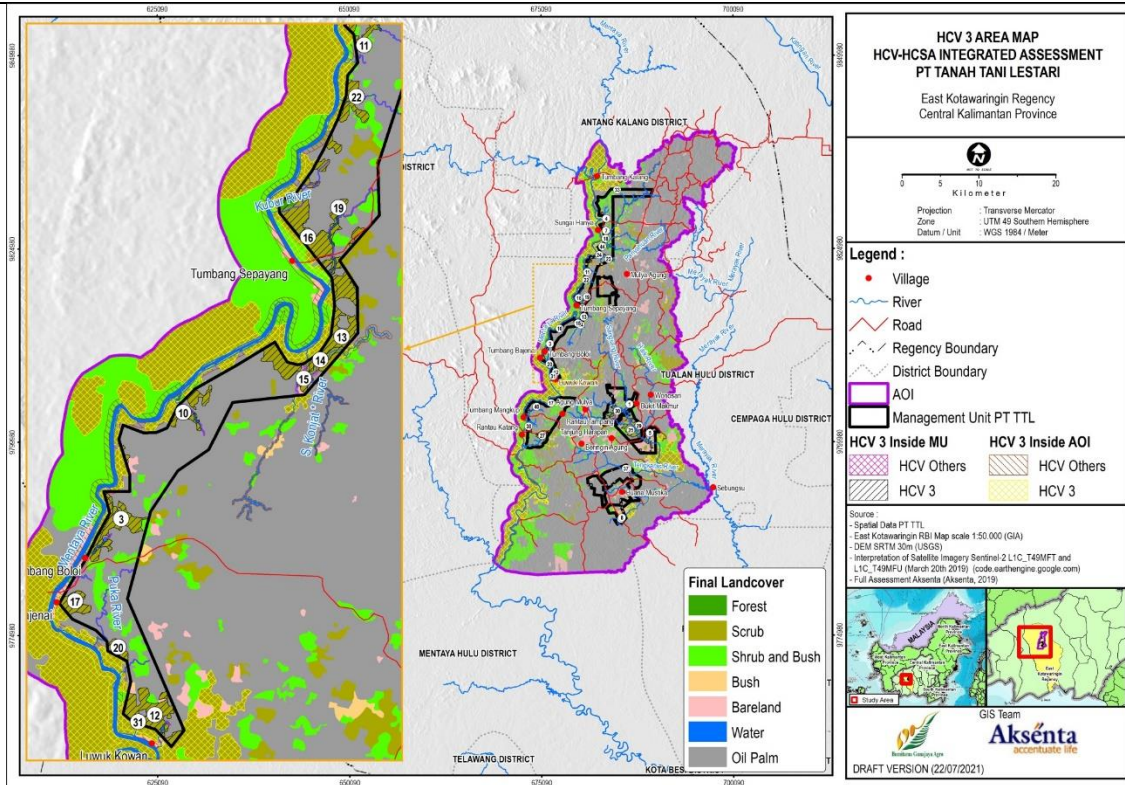
Map 15b. Map of HCV 3 areas in the AoI
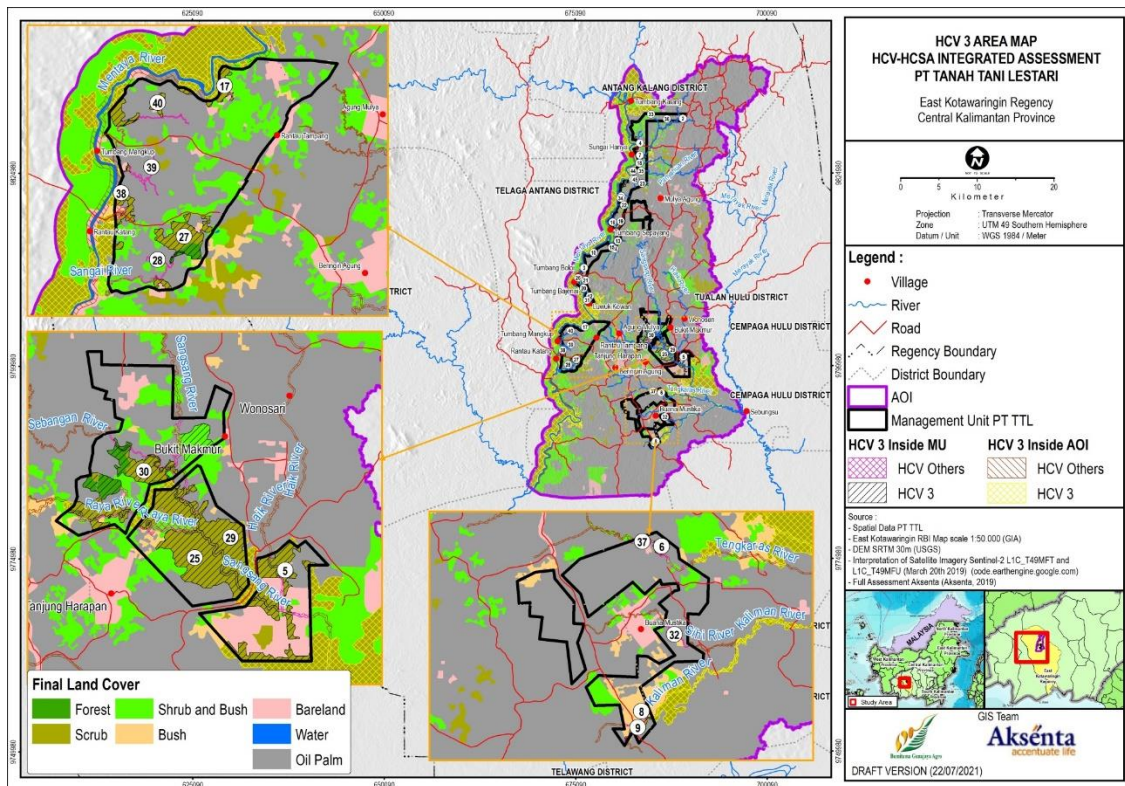
Map 15c. Map of HCV 3 areas in the AoI

Patch Analysis

The identified natural vegetation takes the form of LDF-MDF and YRF. At this phase, physically connected HCS patches are combined into field units. Upon combining, there are 58 HCS patches in the Assessment area. HCS priority patch is classified by identifying the size of its core area. Core area refers to a 100 m-buffer from all HCS patches within and beyond the MU boundaries. There are three classes of priority patch in the AoI, i.e., High Priority Patch (HPP), Medium Priority Patch (MPP) and Low Priority Patch (LPP). HPPs in the MU include three patches with total area of 961.5 ha, while MPPs include 11 patches with total area of 585.2 ha and LPPs include 44 patches with total area of 417.2 ha.

Connectedness analysis indicates that eight MPPs (424.7 ha), as well as 33 LPPs (325.2 ha), are connected to HPPs, while no patch has connectivity function between HPPs. MPP risk assessment indicates that all patches face high risk. Urgency of LPP and no-core LPP is assessed taking into account the function of the patches as the last refugia. Because forest cover area in the AoI is <30%, the remaining LPPs are identified as urgent.

High-risk MPPs are re-assessed taking into account the composition of land cover in the patches. All of the high-risk MPPs in this Assessment take the form of YRF. Therefore, these patches are not areas that need protection with mitigation.

Based on Pre-RBA and RBA analysis, it is known that all MPPs (160.5 ha) and four LPPs (47.5 ha) are in overlap with HCVMA. Therefore, these patches are assigned as indicative areas of conservation with mitigation. Apart from that, there are 7 LPPs that are not in overlap with HCVMA, but because they are not significant for biodiversity, they are assigned as 'give and take development' instead.

Combination between indicative HCS conservation areas and HCVMA 1-4, peat and conservation areas shows 10 indicative conservation patches (total area of 1,169.6 ha), 41 'give and take conservation' patches (total area of 749.8 ha), and 7 'give and take development' patches (44.5 ha). All indicative conservation patches, as well as 32 'give and take conservation' patches, overlap with HCVMA 1-4.

Analysis of forest connectedness in indicative conservation areas and surrounding landscape through 'give and take development' patches does not meet the maximum distance requirement. That is, because forests in indicative conservation areas and surrounding landscape are connected by a distance of 11 km through 'give and take development' patches.

'Give and take' scheme produces HCS conservation area of 1,922.7 ha, which is an accumulation from indicative conservation patches, 'give and take conservation' patches excluded from the scheme, and additional area from the scheme. Additional area from the 'give and take' scheme and 'give and take development' patches excluded from the scheme are assigned as patches for potential development.

Field verification of the planned conservation areas in PT TTL MU area is yet to be done, so that definitive map of conservation area cannot be produced yet. However, at this phase, indicative conservation land use plan can already be mapped. Integration of conservation areas consisting of HCS conservation areas and HCVMAs indicates a potential area for development (2,489.9 ha) (**Table 34** and **Map 16**).

Patch analysis in this Assessment is carried out by following the patch analysis decision tree in HCSA Toolkit (2017). There has been no modification and/or change to this analysis that makes it significantly different from the toolkit. However, the following major notes should be taken concerning the patch analysis output.

1) Conservation areas produced from the patch analysis are still indicative because field verification is yet to be carried out to the planned conservation area. Output of conservation area delineation in the field (it is also recommended to demarcate conservation areas during the field verification and delineation) can then be used as the reference for definitive conservation area map.

2) Based on tenurial study and participatory mapping, indicative conservation areas in the MU produced by the patch analysis are located in lands individually owned by community. Therefore, other than field verification, assignation of conservation area as definitive land use also requires engagement of and approval from the community members in question as the landowners.

3) Some of the conservation areas in PT TTL Location Permit concession overlap with PT Uni Primacom concession. These conservation areas are indicative and recommended to PT TTL. Field verification can be carried out to the

conservation areas against PT TTL concession boundaries that will be mutually agreed by the relevant parties (PT TTL, PT Uni Primacom and the Government).

Table 34. Integration of conservation areas into potential development areas

No	Description	Area (ha)*
1	Assessment area	11,079.4
2	HCVMA (1-6)	2,150.9
3	HCS conservation area	1,922.7
4	Peat	-
Sub-total conservation area		2,125.7
5	Community land	-
6	Planted Area	6,463.7
7	Area for potential development	2,489.9

Note:

* Overlap between HCVMA 1-6 and HCS land cover 1,848.9 ha
  Overlap between HCVMA 1-6 and planted area 98.9 ha
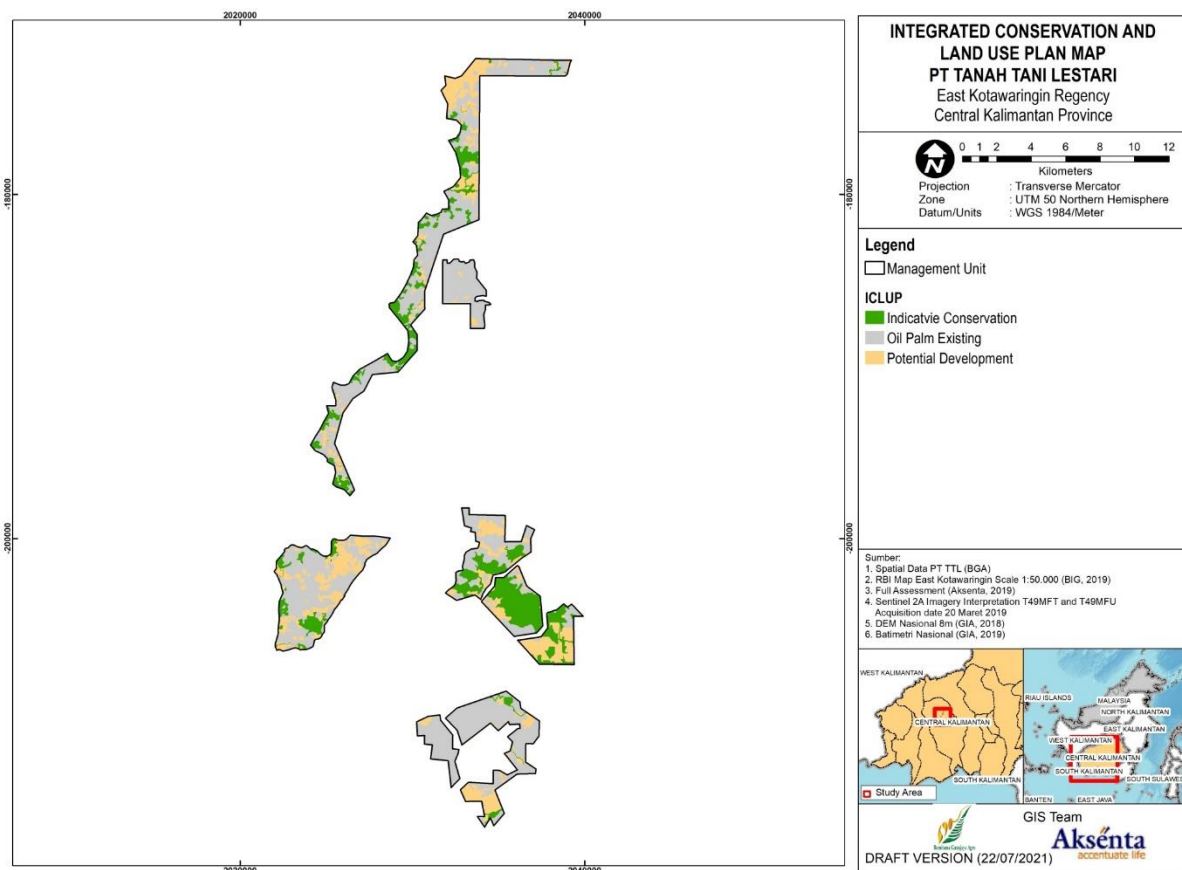
Map 16. Integration of conservation areas and PT TTL land use plan

Management and Monitoring Recommendation

Threat assessment

Threat assessment aims to assist the plantation management in dealing with internal/external threats by means of appropriate management and building the capacity to deal with various threat types and levels. Threat assessment applies IUCN's comprehensive approach that assesses direct threats to species, habitats or ecosystems. The following three factors

are assessed from each threat: (i) time (the period of threat), including the continuity, recurrence both in the near future and in the long run; (ii) scope (the magnitude/proportion of the affected areas/objects, i.e., negligible (0), minority (1), majority (2) and whole (3)), and severity (rate of deterioration due to the threat pressure, i.e., negligible (0), slow (1), rapid (2), very rapid (3)). The period of threats to the HCV-HCSA objects will define the score interval for each level of threat.

The assessment of threat category based on IUCN Threat Category (ITC) has been verified in the field. Out of the 12 categories of threat, five have been found in the AoI, i.e., agriculture/plantation activity, pollution, biological use, operational threats and transportation and service corridors (**35**). The threat intensity is divided into two levels, i.e., medium and low impacts. Medium impacts are sourced from the following sub-threats: land clearing, construction of roads and blocking line during land clearing, agricultural effluent, and inappropriate and ineffective agrochemical application (based on SOP and technical procedure in the field). Low impacts are contributed to by the following sub-threats: commercial logging activity in the remaining shrublands by local community, poaching and fishing.

Table 35. Assessment of intensity of threats to HCV areas in general in the AoI

ITC (IUCN Threat Category)	Sub-Threat	HCV Location	Time	Scope	Severity	Intensity*
Agriculture/ plantation activity	PT TTL plan to clear lands for oil palm planting in its concession	Locations around riparian areas, shrublands in upstream of Sangai and Sangsang and around Mentaya River.	A plan for the future	Majority (2)	Very Rapid (3)	Medium Impact
	Land clearing for community agriculture/plantations in PT TTL concession may potentially change the condition of land cover, particularly in locations around riverbanks, and increase surface runoff and soil erosion.	Locations around riparian areas, shrublands in upstream of Sangai and Sangsang and around Mentaya	Will reoccur in the near future	Minority (1)	Very Rapid (3)	Medium Impact
Pollution	Agricultural effluent such as application of fertiliser, pesticide and herbicide around riparian zones.	Areas around riparian areas that have been converted into oil palms (HCVMA)	Will reoccur in the near future	Whole (3)	Slow (1)	Medium Impact
Biological use	Logging activities by community in the remaining shrublands Poaching	Shrublands in upstream of Sangai and Sangsang and around Mentaya	Will reoccur in the near future	Minority (1)	Rapid (2)	Low Impact
	Fishing	Raya, Sebangan and Sangsang Rivers	Will reoccur in the near future	Minority (1)	Slow (1)	Low Impact
Operational threats	Inappropriate and inefficient agrochemical application	Oil palm plantations around the riparian zone	Will reoccur in the near future	Whole (3)	Slow (1)	Medium Impact
Transportation and service corridors	The Company plan to construct roads and blocking line during initial phase of land clearing	Locations around riparian areas, shrublands in upstream of Sangai and Sangsang and around Mentaya	A plan for the future	Minority (1)	Very Rapid (3)	Medium Impact

The major causes or sources of threat that contribute to the pressures are mostly from external factor (community). This is because HCV areas are in areas where community freely use forest resources and these activities have long been carried out (before land acquisition by the Company). These include logging, poaching and fishing in the rivers.Meanwhile, the internal threats come from the application of chemicals around riparian zones.

Recommendation by HCV

HCV management general objectives include maintaining HCV elements and, when necessary, the areas' important values can be enhanced. HCV element maintenance is the minimum requirement in HCV management, which can be carried out by protecting HCV areas and mitigate the threats they face to prevent the values from getting degraded. In addition, the Company is also expected to be able to restore important HCV getting diminished out of negative impacts from its operational activities.

This Assessment indicates 47 locations of HCV and HCVMA. In general, the HCVMAs take the form of bush/thicket, currently sound shrublands, riparian zone/buffer, sacred sites and swamps (Table 36). All of them should be managed as conservation areas and cannot be cleared or otherwise developed for oil palm plantation ('No Go Area'). As for the HCVMAs that have already been planted with oil palms (98.9 ha), strict conservation management should apply to them to protect the conservation areas and prevent from any land clearing/replanting activities. Concerning the conservation areas in overlap with PT Uni Primacom (Map ID 5 and 29), PT TTL MU should immediately communicate, build understanding and collaborate with the company to protect the conservation areas.

Table 36. Locations and sizes of the proposed HCV areas and HCVMAs

Map ID	HCV Type	Location/Description	Area (ha)	
			HCV	HCVMA
1	3, 4	Swamp	54.8	54.8
2	1, 4	River Baras		3.1
3	1, 3, 4, 5	River Boloi and its naturally vegetated riparian area	36.2	36.6
4	1, 3, 4	River Bus and its naturally vegetated riparian area (shrub)	13.2	18.7
5	1, 3, 4, 5	River Haik and its naturally vegetated riparian area (shrub)	110.2	114.9
6	1, 3, 4	River Tengkaras floodplain	14.2	14.2
7	1, 3, 4	River Hanya and its naturally vegetated riparian area (forest & shrub)	95.6	122.3
8	1, 3, 4	River Kaliman and its naturally vegetated riparian area (shrub)	7.3	9.3
9	1, 3, 4	Ank River Kaliman and its naturally vegetated riparian area (shrub)	14.4	15.1
10	1, 3, 4	River Kayu Anak and its naturally vegetated riparian area (shrub)	13.8	14.8
11	1, 3, 4	River Kecil and its naturally vegetated riparian area (shrub)	10.8	13.6
12	1, 3, 4	River Komot and its riparian area, and naturally vegetated areas (shrub)	55.7	56.1
13	1, 3, 4, 5	River Ank Konjat and its riparian area, naturally vegetated areas (shrub)	84.2	84.2
14	1, 3, 4, 5	River Konjat and R. Anak Konjat & their naturally vegetated riparian (shrub)	17.2	18.9
15	1, 3, 4, 5	River Konjat Pohon and its naturally vegetated riparian area (shrub)	2.0	3.1
16	1, 3, 4	River Kubur and its naturally vegetated riparian area (shrub)	66.2	69.7
17	1, 3, 4, 5	River Mentaya and its naturally vegetated riparian area (shrub)	216.5	222.1
18	1, 3, 4	River Panyahuan and its naturally vegetated riparian area (forest & shrub)	23.3	29.0
19	1, 3, 4	River Paparalas H* and its naturally vegetated riparian area (shrub)	26.7	31.1
20	1, 3, 4	River Pinding and its naturally vegetated riparian area (shrub)	11.5	12.7
21	1, 4	River Puka		5.4
22	1, 3, 4	River Rangkong and its naturally vegetated riparian area (shrub)	1.0	3.1
23	1, 3, 4	River Rantian and its naturally vegetated riparian area (shrub)	23.9	38.2
24	1, 3, 4	Ank River Rantian and its naturally vegetated riparian area (shrub)	13.3	16.4
25	1, 3, 4, 5	River Raya and its naturally vegetated riparian area (forest & shrub)	412.1	474.3
26	1, 4	River Runi and its riparian area		0.9
27	1, 3, 4	River Sangai and its naturally vegetated riparian area (shrub)	115.1	122.6
28	1, 4	River Sangai's tributary		1.6
29	1, 3, 4, 5	River Sangsang and its naturally vegetated riparian area (shrub)	291.7	314.7
30	1, 3, 4, 5	River Sebangan and its naturally vegetated riparian area (forest & shrub)	104.6	107.8
31	1, 3, 4	River Serupih and its riparian area	0.4	0.4

32	1, 4	River Sihi and its riparian area		6.0
33	1, 3, 4, 5	River Tanggiran and its naturally vegetated riparian area (shrub)	3.5	6.5
34	1, 4	River Teluk		0.8
35	1, 4	River Tempahas and its riparian area		10.1
36	1, 4	River Tengang and its riparian area		2.2
37	1, 3, 4	River Tengkaras and its naturally vegetated riparian area (shrub)	4.5	22.2
38	1, 3, 4	River Ubai Besar and its naturally vegetated riparian area (shrub)	35.4	45.8
39	1, 4	Ank River Ubai Besar		3.2
40	1, 3, 4	River Ubai Kecil and its naturally vegetated riparian area (shrub)	17.5	24.1
41	6	Batu Ampar sacred site	0.03	0.03
42	6	Bukit Gantung sacred site	0.03	0.03
43	6	Marso sacred site	0.03	0.03
44	1, 3, 6	Oeng sacred site	0.03	0.03
45	1, 4, 6	Rantian sacred site	0.03	0.03
46	6	Simpang Tiga sacred site	0.03	0.03
47	6	Untung sacred site (mill)	0.03	0.03
		Total	1897.1	2150.9

HCVMA monitoring concerns with the values/functions inherent to the HCV area in question, as to whether they enhance or deteriorate. HCV area size monitoring has already been decided concerning the coverage areas that remain with HCV values/functions (HCV 1-5). Other than element indicators, the management strategy is also monitored. It is likely that HCV values/function might deteriorate in the future. As for management strategy monitoring, this includes the following.

1) Implementation of the management strategy in the field, as to whether the planned strategy is easy to implement in the field (operational monitoring).

2) When the management strategy is poorly implemented. Although it is carefully planned, if poorly carried out, it would not reach the expected objectives and goals (strategic monitoring/effectiveness).

3) New or changed threats/conditions. An effective management strategy at a time may no longer be effective at the others (threat monitoring).

The output of this monitoring serves as the basis to evaluation to ensure whether the HCV area management strategy is implemented following the objectives and goals. Goals in this HCV area management system are adaptive management system where the management constantly makes effort for continuous improvement in HCV management and monitoring. See **Table** in Template 3 for management and monitoring recommendations for each HCV area and value.

Section 5: FPIC

In FPIC Activities, the company uses several methodologies as follows:

- Document Review;

- Interviews;

- Participatory Mapping;

- FGDs and Field Visits.

For the first step, the company formed a Survey Team, this team consisted of company staff who handled social management, conflict management, agronomy, GIS, environmental planning, and other related divisions. In FPIC activities and other socialization activities, the company's survey team will be assisted by the Satlak Team (public relation team) formed by the village government, whose function is to become a liaison between the company and the local community/community.

Document Review/ Desk Study

Document review activities include:

- Identification of villages, hamlets that will be affected by the company's operations, as well as the existence of customary community rights.

- Preparation of materials and methods of socialization to the community

- Overview of community development/ CSR program planning

- Study of local tenure system and mapping of local tenure systems

- Procedures for implementing participatory mapping

Participatory Mapping

Participatory mapping was carried out in each village, followed by searching for information from participatory mapping through interviews and field visits.

Participatory mapping was carried out jointly by the Company's Survey Team, local communities, and Satlak Team, ensuring that the representatives of the subject of tenure rights were met. Participatory mapping is expected to cover:

- Indicative boundaries of villages/hamlets/villages within the company's concession;

- Areas of designation and use by the community (gardens, rice fields, fields, non-timber forest product areas, cultural sites, sacred areas, village forest areas/other customary rights, land reserves, springs, and settlements; and

- Main access locations along with supporting infrastructure

Therefore the description of the land category in the location of the company's permit will be obtained.

Participatory mapping was carried out in the six villages that were the assessment areas.

Focus Group Discussion

The socialization and FGD were carried out by considering the following:

- Adjustment of the language and media used to the conditions of society and the community

- Information on personnel who will be responsible for community complaints and aspirations

- Explanation of the company's objectives and operational areas. Location and purpose of allocation of conservation areas/other protected areas within the company area, if any

- Procedures for handling conflicts and complaints

- Availability of time to think/consider options for the community

- Freedom to obtain information/assistance from other parties, and free from any form of intimidation, especially in processes that require negotiation, building agreements, deliberation to reach consensus and decision making.

FPIC process have been showed by evidence of land compensation process, for examples; Letter of Land Delivery (included attachment of land position & boundaries), Citizenship Card of land owner and Payment Receipt by company to land owner. There is summary of land compensation process within this period covering 4,490.89 hectare and divided in two sub-District, Telaga Antang and Antang Kalang.

There was sighted evidence of socialization by the company related to development of nucleus plantation and smallholder program:

- Socialization for development of nucleus plantation and smallholder program in Tumbang Mangkup Village on 12 June 2010
- Socialization for development of nucleus plantation and smallholder program in Tumbang Sangai Village on16 June 2010
- Socialization for development of nucleus plantation and smallholder program in Luwuk Kowan Village on 18 June 2010

The material presented includes plans for oil palm plantation development, partnership plantation patterns and technical requirements and land legality that can be built for plantations as well as support and agreement on the value of GRTT compensation.

Through the company's PR officer, PT TTL has also prepared participatory maps of land ownership and boundaries in certain villages. Participatory mapping with communities aims to look at Customary Land, land rights, land boundaries, and land use patterns. At the time of land release, the Company collaborated with the Satlak Desa Team for the processes of measuring and leveraging the land. From this process, community spatial data are generated in the form of maps, which will then become the basis for land compensation (GRTT).

As for now, PT TTL has obtained a land area of 4,490.89 ha of GRTT, with 969 persils (landowner) spread over some villages. Of these, 4,283.95 ha have obtained HGU certificates based on the Decree of the Head of BPN No 59/HGU/KEM-ATR/BPN/2016 dated 27 September 2016.

Section 6: Soil and topography

The soil type and suitability survey activity at PT Tanah Tani Lestari was carried out in February - March 2022, by the Bumitama Internal Team.

Table 37. Soil Type and Suitability Survey Team

No.	Name	Position	Expertise
1.	Agung Kurniawan	Team Leader, Research Dept.	Surveyors, Soil Surveys, Morphological Identification and Soil Classification
2.	Agus Setiawan	Team Member, GIS Dept.	Remote sensing
3.	Agus Prastama	Team Member, Research Dept.	Surveyors
4.	Mitra Wijaya	Team Member	Surveyors
5.	Khoirul Anwar	Team Member	Surveyors
6.	I Ketut Darsana	Team Member	Agronomy
7.	Sofandhi Maruli Tua Manik	Team Member	Agronomy

Soil Type Analysis & Survey

The activity is divided into three stages, as follows:

i. Preparation. Held in the 2nd week of February 2022.
ii. Field survey. This activity is divided into two parts, namely (i) in-house training for the GIS team and PT TTL field workers on land survey procedures, and (ii) survey implementation. The field survey was carried out in the 2nd week of February – Sunday 3 February 2022.
iii. Analysis and preparation of reports. Analysis of the results of the survey and documenting it in a report on the results of activities accompanied by maps related to land. Held on the 2nd week of March 2022.

This soil survey and mapping activities in the area of PT TTL uses SNI 8473:2018 on semi-detailed land surveys and mapping at a scale of 1:50,000 as a guideline. Of all the stages and methods in the manual, there are several sections that are adapted

to the objectives of this activity, for example regarding the interpretation of landforms using existing previous data, namely maps of land systems at a scale of 1:250,000. Soil type data also follows the soil type approach in the surrounding area that has been carried out in previous surveys.

Methodology

1. Preparation

Supporting materials and data used:

- A 1:50,000 scale digital base map of Indonesia's topography (RBI) published by the Geospatial Information Agency (BIG);
- Digital elevation model (DEM) maps of 30 m resolution from SRTM, topographic digital contour maps, or from other sources;
- Landsat remote sensing/satellite imagery;
- Digital geological maps with a scale of 1:100,000 - 1:250,000 published by the Geological Research and Development Centre (Puslitbang);
- 1:250,000 scale land system map published by the Geospatial Information Agency (BIG);
- Map of existing land use from previous studies; and
- Climate data from the nearest weather station.

1.1 Land Unit Analysis

Land unit analysis is differentiated based on landform unit, source rock unit, and relief/slope unit which can be performed simultaneously. This activity does not create a new land map unit, but uses the existing one, namely the 1:250,000 scale RePPPort land system map as a reference. Land system map attributes used to describe land units are variables that affect the process of soil formation and determine soil properties and can be used as a basis for distinguishing soil map units and/or soil types. The analyses in this stage consist of lithology, landform, relief/slope analysis and actual land use.

1.2 Preparation of the Field Observation Plan

Planned maps of soil observations in the field are prepared by considering the diversity of land units, observation techniques, transect systems, accessibility (easy to reach) and available time.

Semi-detailed soil mapping requires 1 observation point for every 250-500 m with an interval between pilot lines/transects of 1 km. The combination of the two transect systems becomes a working map for field observations. In addition, as a consideration of the difficulty level of access in the field, the working map is overlaid with satellite images that can describe land use and cover.
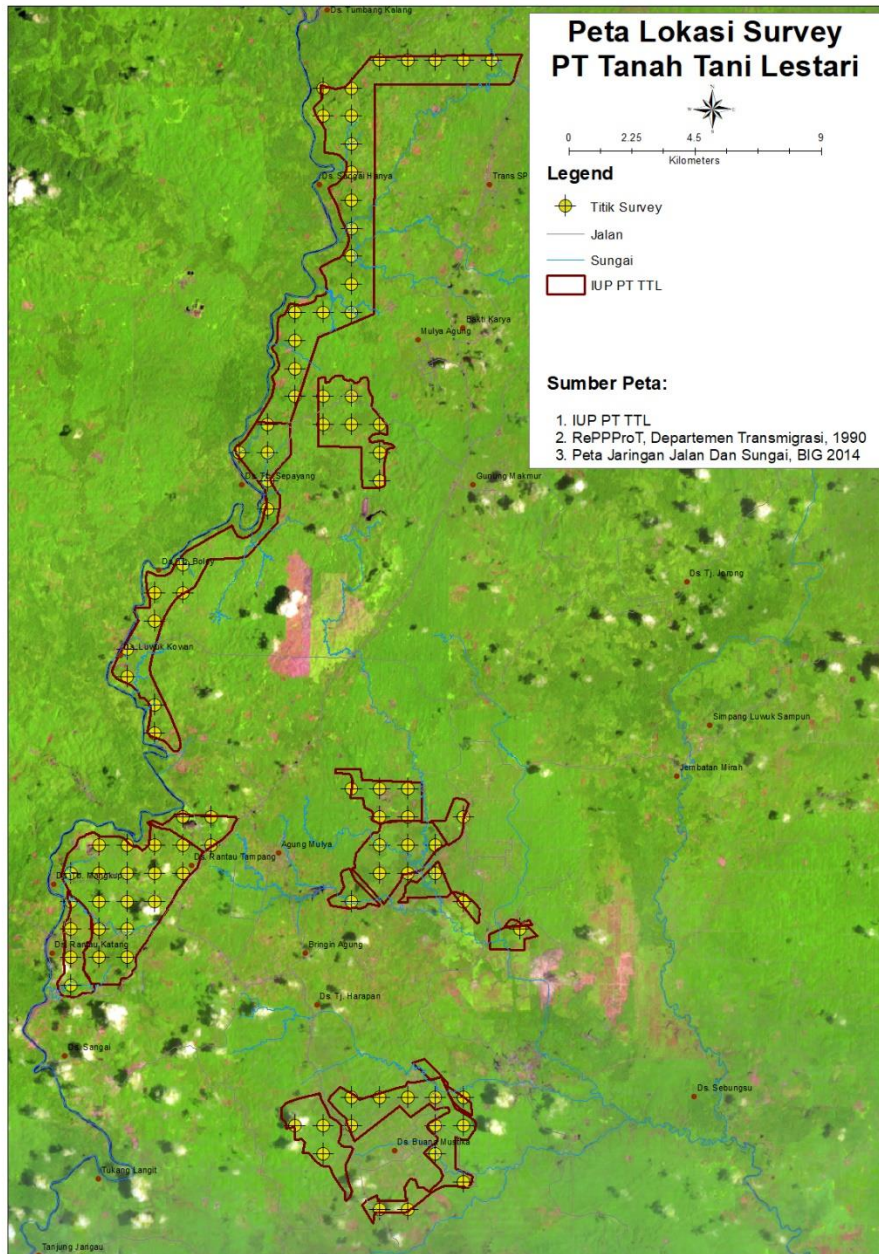
Map 17. Survey Plan Map

2. Field Observation/ Ground Truthing

2.1 Land Unit Observation

The important parts to be examined are the delineation of the land unit and its suitability with field conditions related to landform elements, parent material, and relief/slope, as well as other information, such as land use and vegetation. Field verification is carried out mainly on representative land units that have a fairly wide distribution. Observations are made at each planned point by considering:

    i.   Observation of soil properties and their distribution in the field,

    ii.   The appearance of changes in the micro-relief of the land surface in flat areas, while for sloping areas, taking into account the slope, position and shape of the slopes. If there are representative land units that are difficult to visit

due to low accessibility, data extrapolation can be carried out based on the similarity of land unit characteristics or from the approach of land survey results in adjacent areas. The results of the observations of these land units are hereinafter referred to as soil map units (SPT).

2.2 Description of the cross section/soil profile

The methods used to describe the cross-section of each land unit at a scale of 1:50,000 (soil group/subgroup) include:

i. Soil drilling carried out as deep as 100 cm in mineral soil.
ii. Minipit excavation, manufacture of minipits as deep as 50 cm with a length and width of 50 x 50 cm. Observation of the soil in the minipit was followed by drilling as deep as 100 cm.
iii. The description of the soil profile can also be done from a cross-section of the soil profile that has been exposed at the edge of the road or the edge of the cliff.

2.3 Land classification and mapping

Soil classification is determined in the field and can then be corrected with laboratory analysis data. The soil classification used in this activity is the USDA Soil Taxonomy system (Soil Survey Staff, 2014) and the National Soil Classification (BBSDLP, 2014) up to the subgroup level (semi-detailed map scale).

Field observation maps and field land maps are prepared based on the results of observations of land units and soil units from the results of drilling, minipit and profile observations. During field observations, corrections are made to land units, both to delineation and naming land units according to field conditions (ground truth). The map legend created in this activity is adapted to its purpose, which is to identify soil types.

Study and Analysis

1. Land Unit

The land unit in this study uses pre-existing data and maps, especially the 1990 RePPPort land system map. The map has presented land unit elements consisting of landform, lithology/parent material and relief/slope at the scale of the review soil (1:250,000). Land units from this land system are used as material to be verified in the field, so that this activity can produce soil map units (SPT) and soil type maps on a semi-detailed scale (1:50,000).

PT TTL area is divided into four land systems, which consist of the Honja, Rangankau, Pakalunai and Lohai land systems. Each land system has landform, lithology, and slope/ relief variables (Table 38). According to the land system map (Map 18), the soil types in most of the study areas are (Dystrudepts, Paleudults and Plinthudults and a small portion of Udifluvets). Most of the soil is of the order Inceptisol with clay sediment as parent material from the Mentaya river and the order Ultisol from the old volcanic hills incised. This information is used as a reference for field verification.

Table 38. Land System within PT TTL Area

Land System	Landform	Parent Material/ Lithology	Relief	Soil Great Group	Area	
					(ha)	(%)
Honja	Plains, Hills	Bat.Intrusi a=Andesite, b=B, granodiorite; schist; granite	15-25	Paleudults, Plinthudults, Dystrudepts	1,171.74	12.71

Rangankau	Plains,	Andesite, basalt, granite, schist; recent alluvium (riverine)	0-8	Paleuduts, Dystrudepts	7,218.53	78.32
Pakalunai	Plains,	Granite, schist, basalt, phyllite, granodiorite,	8-15	Dystrudepts, Udifluvents	824.27	8.94
Lohai	Plains,	Sandstone	25-30	Paleudults	2.51	0.03
				Total (ha)	**9,217.04**	100

2. Biophysical Condition

The area of PT TTL is in a tropical climate. The annual rainfall pattern is equatorial with the amount of rainfall around 3,000 mm/year and 130-140 rainy days. The peaks of rain occur in March-April and November-December, while the dry period occurs in July-September. In the context of a watershed (DAS), this area is located in the lower reaches of the Mentaya watershed. Hydrologically, the flow of the Mentaya River is influenced by the distribution of rainfall in its catchment area. The rivers that cross the northern part of the study area are the Bus River, Baras River, Hanya River, Kubur River, Tempahas River and Sugai Tengang. While in the southern part of the study area flows the Sangsang River, Sebangan River, Sihi River, Tengkaras River, Kaliman River and Mentaya River. The climatic and hydrological conditions affect the process of soil formation.

The concession area of PT. TTL has an elevation of about 1 – 69.98 masl with a slope of about 0-8% (Map 19). Topography areas that tend to be flat with locations near the Mentaya River are at risk of temporary flooding. In this section there is a fluviatile process so that it has an alluvial landform. This process will cause the accumulation of parent material from alluvial deposits, either in the form of dust, clay or sand.

The land cover condition at the time of the survey was mostly community oil palm plantations and dry land agriculture in the East and North, scrubland, paddy fields and dry land agriculture in the South, and dry land agriculture in the West (Map 20). The proposed area for planting oil palm is mostly mineral soil.
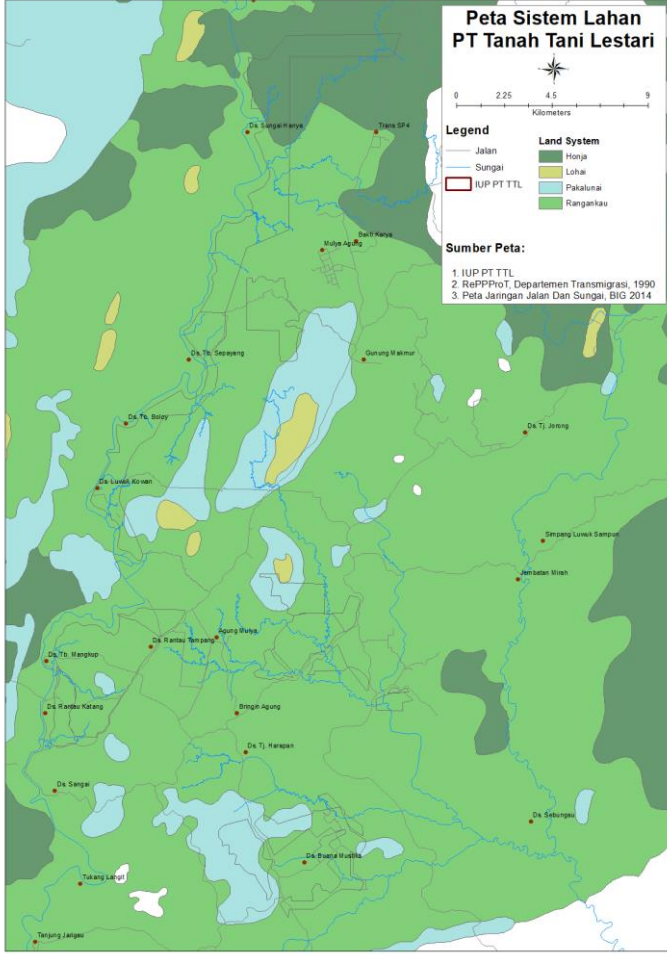
Map 18. Land System Map
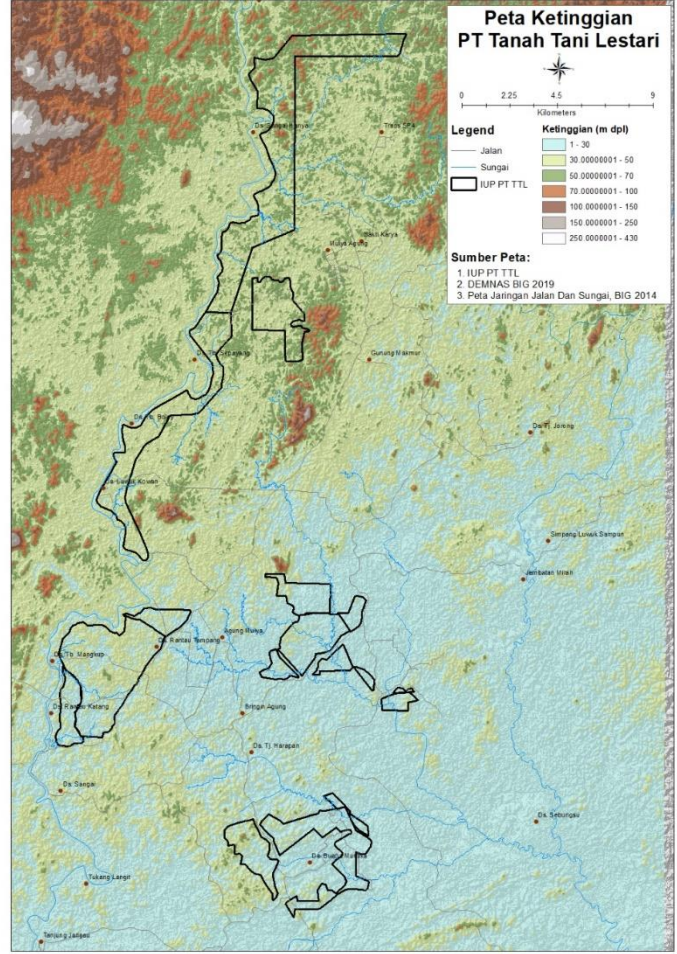
Map 19. Elevation Map
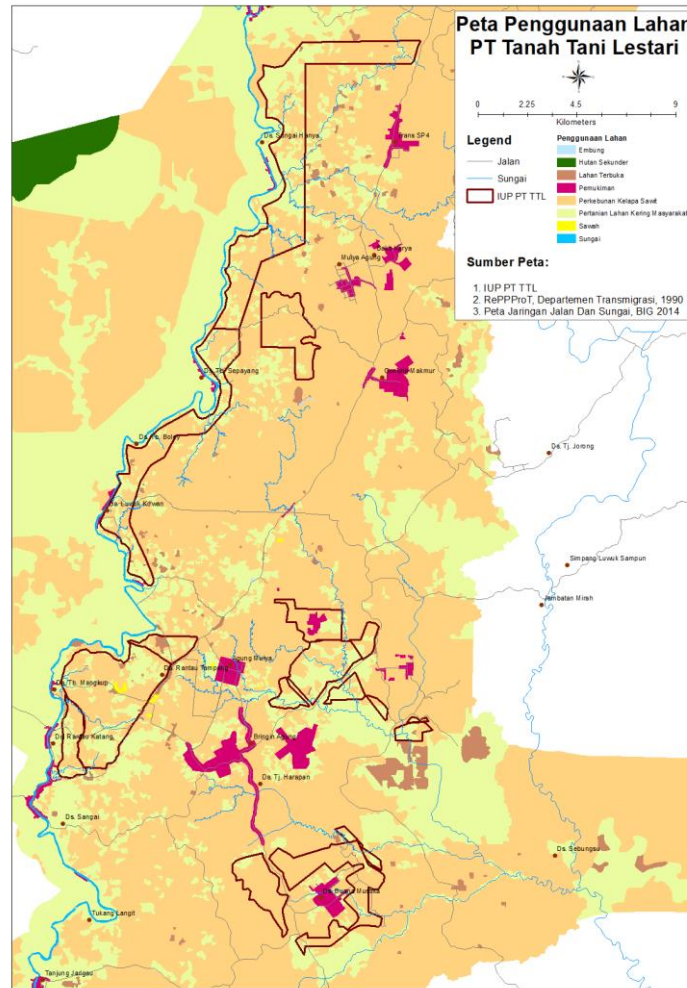
Map 20. Land Use Map

Soil Characteristics and Classification

1. Land Map Unit

Analysis and verification of land unit observations resulted in 4 land map units (SPT). Each land unit (SPT) is formed from a different landform and lithology/parent material. Meanwhile, the slope/relief limiting factor shows that all SPTs have the same slope level, namely 0-15%. SPT-1 and 2, located in the North and Central parts, are Typic Dystropepts with clay texture characteristics, finer sandy loam, and Typic Hapludults with slightly reddish clay characteristics. In the South part there are Typic Tropudults with characteristics of gravel layers and a small portion of Typic Fluvaquents. The most dominant SPT is SPT-1 which is a landform plain.

Table 39. Land map unit legend in the PT TTL concession area

SPT	Land Unit	Proportion	Landform	Parent Material	Relief	Area	
						Ha	%
SPT-1	District Cambisol, Deep, Good Drainage, Texture Sandy loam, acid, (Typic Dystropepts - Dystrudepts)	D	Metamorphic and Alluvial Plains	Sediment Clay/Claystone	Flat (0-8%)	7,191.54	78,02

SPT-2	Moderate Ortic Podsol, Medium drainage, Clay loam texture, acid, (Typic Hapludults - Paleudults)	M	Metamorphic Tectonic	Dusty clay	Flat (0-8%)	1,557.96	16,90
SPT-3	District Kambisol and Podsol, Deep, Good drainage, medium texture, acid, (Typic Tropudults-Plinthudults)	T	Metamorphic Tectonic	Clay, mud and dust	Hilly (0-15%)	385.80	4,19
SPT-4	Gleisol and Udic District, moderate, Medium-heavy drainage, Sandy loam texture, acid, (Typic Fluvaquents - Udifluvents)	T	Alluvial	Sand, clay and mud	Sloping (0-3%)	81.64	0,89

Note:

SPT = Satuan Peta Tanah (Land Map unit)
P (Pre-dominant/sangat dominan) = > 75%,
D (Dominant) = 50-75%,
F (Fair/sedang) = 25-49%,
M (Minor/sedikit)= 10-24%,
T (Trace/sangat sedikit) = < 10%
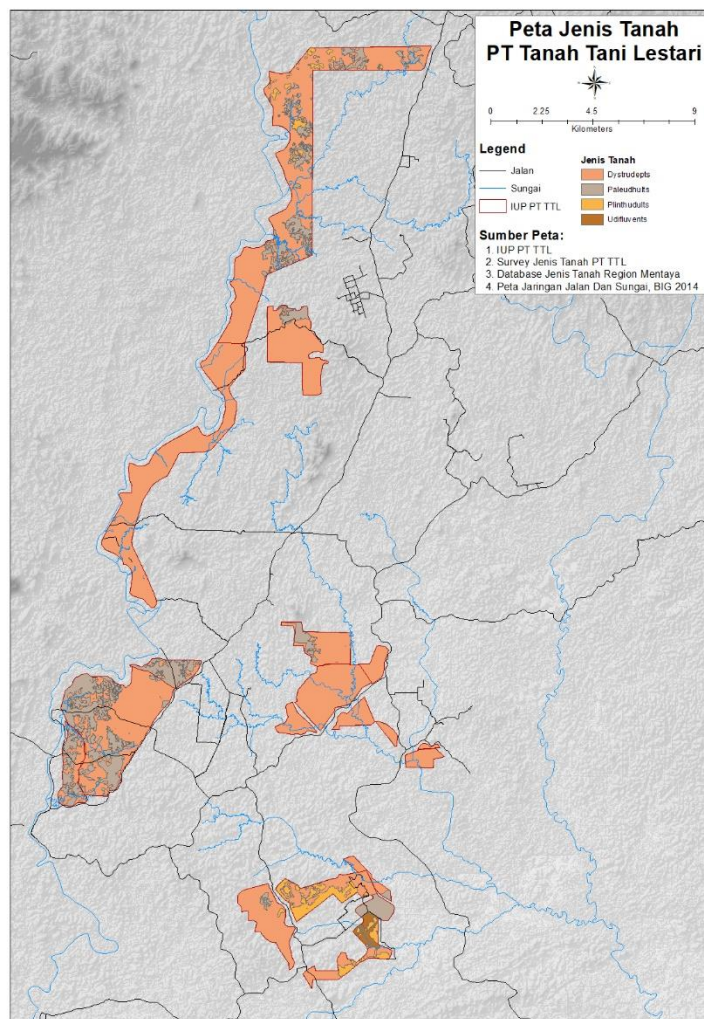
Map 21. Map of Soil Type(s) in PT Tanah Tani Lestari

2. Description of the cross section/soil profile

Representative soil profiles are described and represent each soil unit (soil group/subgroup). This profile is important for determining and classifying soil types. The data and information presented in the description of the soil profile are field observation data. The following is a description of each SPT and soil type.

SPT-1 (Typic Dystrudepts)		
Code	:	04
Location	:	Block R02z BBGE
Parent Material	:	Clay
Marking Horison	:	Kambik
USDA Soil Type	:	Typdic Dystropepts (Dystrudepts)
Vegetation	:	Oil Palm, Rubber
Physiography	:	Flat – Undulating
Slope	:	Flat (8 – 15%)
Drainage Class	:	Good

Layer Symbol	Layer Depth (cm)	Description
A	0-25	Dark bown (10 YR 4/3); dusty clayey clay; weak, rounded lumps; crumbly; fine and medium roots are numerous; micro and meso pores are numerous; not clear boundaries
B1	25-65	Brown (10 YR 4/4); dusty clayey clay; weak, rounded lumps; crumbly; fine and medium roots are numerous; micro and meso pores are few; clear boundary
B2	> 65	Brown (10 YR 5/3); dusty clay; firm, angular lump; slightly friable; fine roots are few and moderate many; micro and meso pores are few; clear boundary

SPT-2 (Typic Hapludults)

Code	:	10
Location	:	Block T11y BDME
Parent Material	:	Clay
Marking Horison	:	Ortic Podsol
USDA Soil Type	:	Typdic Hapludults (Paleudults)
Vegetation	:	Rubber, Young Shrubs
Physiography	:	Flat – Undulating
Slope	:	Flat (8 – 15%)
Drainage Class	:	Good

Layer Symbol	Layer Depth (cm)	Description
A	0-8	Dark Brown (7,5 YR 4/4); dusty clay loam; friable, angular globules; rather firm; fine and medium roots are numerous; micro and meso pores are numerous; not clear boundaries
B1	9-58	Light Brown (7,5 YR 5/4); dusty clay; rather firm, angular lumps; crumbly; fine and medium roots are numerous; micro and meso pores are few; not clear boundaries
B2	59-100	Light Brown (7,5 YR 6/4); dusty clay; firm, angular lump; slightly friable; fine roots are few and moderate many; micro and meso pores are few; clear boundary

SPT-3 (Typic Tropudults)

Code	:	14
Location	:	Block A06a SMRE
Parent Material	:	Stone, Laterite
Marking Horison	:	Kambisol
USDA Soil Type	:	Typdic Tropudults (Plinthudults)
Vegetation	:	Young Shrubs
Physiography	:	Hilly
Slope	:	Undulating – Hilly (15 – 25%)
Drainage Class	:	Good

Layer Symbol	Layer Depth (cm)	Description
A	0-30	Reddish Yellow (5 YR 5/6); dusty clay loam; slightly friable, angular lumps; rather firm; many fine and medium roots; many micro and meso pores; clear boundary
B	30-100	Red (2,5 YR 4/6); dusty clay; firm, angular lump; there are pebbles; few fine and medium roots; micro and meso pores are few; clear boundary

SPT-3 (Fluvaquents)		
Code	:	17
Location	:	Block A06a SMRE
Parent Material	:	Sand and Clay
Marking Horison	:	Udik
USDA Soil Type	:	Typdic Fluvaquents (Udifluvent)
Vegetation	:	Young Shrubs, Oil Palm
Physiography	:	Flat
Slope	:	Flat (0 – 8%)
Drainage Class	:	Not Good

Layer Symbol	Layer Depth (cm)	Description
O	0-4	Dark Yellowish Brown (10 YR 3/6loamy sand; friable, lumpy round; weak; fine and medium roots are numerous; micro and meso pores are numerous; clear boundary
A	5-62	Yellowish Brown (10 YR 6/8); loamy sand; loose; subangular clumps; no stones; fine and medium roots are numerous; micro and meso pores are few; clear boundary
B	63-100	Yellowish Brown (10 YR 5/6); sandy loam; plastic; subangular; no stones; slightly coarse and fine roots; micro and meso rays are few; clear limits

3. Classification and Mapping of Soil Types

Soil type mapping provides information on soil types up to the subgroup level. The results of the analysis and field observations show that there no peat soil types and there are 4 types of mineral soil at the subgroup level. Subgroups Typic Dystrudepts, Typic Hapludults, Typic Tropudults and Typic Fluvaquents. This difference is more due to the parent material making up the soil and the environment forming soil pedogenesis. Each soil type is mapped in (Map 21) and the area per each soil type can be seen in (Table 40).

Table 40. Total area by soil type in PT TTL

Soil Type	Area	
	Ha	%
(Typic Dystropepts - Dystrudepts)	7,193.23	78.04
(Typic Hapludults - Paleudults)	1,557.06	16.89
(Typic Tropudults-Plinthudults)	385.12	4.18
(Typic Fluvaquents - Udifluvents)	81.64	0.89

Land Suitability Analysis

Classification of land suitability for oil palm on mineral soils surveyed at the research site, referring to land suitability criteria for oil palm based on technical guidelines for oil palm management published by the Palm Oil Research Center (PPKS) 1995.

Table 41. Land Suitability Criteria for Oil Palm on Mineral Soil

No.	Land Characteristic	Symbol	Limiting Factor Intensity			
			Tanpa (0)	Light (1)	Moderate (2)	Heavy (3)
1.	Rain fall (mm)	h	1,750 – 3,000	1,500 – 1,750; >3.000	1,250 – 1,500	<1,250
2.	Dry Month (<60 mm)	k	<1	1-2	2-3	>3
3.	Nutrient Retention – Soil CEC (cmol/kg)	nr	>16	5-16	<5	-
4.	Elevation (masl)	l	1 – 100	200 – 300	300 – 400	>400
5.	Territory Shape / Slope (%)	w	Flat – Undulating <8	Wave – Undulating 8-15	Undulating – Hilly 15-30	Hilly – Mountainous >30
6.	Rocks on the Surface and in the subsurface (% v)	b	<3	3-15	15-40	>40
7.	Effective depth (cm)	s	>100	75-100	50-75	<50
8.	Soil Texture	t	Dusty Loam, Sandy Loam Clay, Dusty Loam Clay, Loamy Clay	Clay, Sandy Clay, Sandy Loam, Loam	Loamy Sand, Dust	Heavy Clay, Sand
9.	Drainage Class	d	Good, Fair	Slightly Obstructed, Fast	Fast, Obstructed	Very fast, Very Obstructed, Flooded
10.	Soil acidity (pH)	a	5.0 – 6.0	4.0 – 5.0	3.5 – 4.0	<3.5

Source: Buana, L., D. Siahaan, dan S. Adiputra. 2003. Modul M-100-203. Kultur Teknis Kelapa sawit, penilaian kesesuaian lahan, disain kebun dan pembukaan lahan. Pusat Penelitian Kelapa Sawit. Medan. Hal:1-9

Table 42. Classification of Land Suitability for Oil Palm Plants

Land Suitability Class	Criteria
S1 (Very Suitable)	Land units having no more than one light delimiter (optimal)
S2 (Suitable)	Land units that have more than one light barrier and/or do not have more than one moderate barrier
S3 (Quite Suitable)	Land units that have more than one medium barrier and/or do not have more than one heavy barrier
N (Unsuitable, Conditional)	Land units that have two or more heavy barriers that can still be repaired

The analysis will be carried out by tabulation or matching using a limiting factor between the parameters that have been previously arranged in a desk study with the results of surveys and sampling from the location.

The primary data required are physical and chemical properties and soil physics by taking whole or composite soil samples. The parameters for compiling community oil palm technology assembly consist of overflow typology, plant age, seed preparation, land preparation and planting, fertilization, maintenance and harvesting. Secondary data includes climate data, geological maps, land system maps, hydrological maps, topographic maps.

Table 43. Land Characteristics of PT TTL

No.	Land Characteristic	Symbol	General Condition
1	Rain Fall (mm)	h	2400 - 3626
2	Dry Month (<60 mm)	k	2-3
3	Elevation (masl)	l	7 - 108
4	Territory Shape /	w	Flat – Undulating
	Slope (%)		8 – 30
5	Rocks on the Surface and in the subsurface (% v)	b	<3
6	Effective depth (cm)	s	75-100
7	Soil Texture	t	Sandy Loam, Dusty Loam
8	Drainage Class	d	Good, Fair
			Slightly Obstructed, Fast
			Obstructed, Fast
9	Soil acidity (pH)	a	4.01 – 4.65

Topography

Based on DEMNAS Indonesia data analysis, the AOI land elevation ranges from 5-216 masl. PT TTL is dominated by land elevation less than 58.8 m above sea level (83%). The highest land elevation is in the northern part of TTL (upstream of the Hanya River), while the lowest elevation is in the southeast of TTL (Sangsang River Estuary).

PT TTL is a flat to undulating plain with a slope class dominance of less than 8% (about 70% of PT TTL). These relatively sloping areas are found around major rivers (Mentaya River, Hanya River, Sangsang River, Haik River). There is only a small area of land that has a bumpier to hilly topography. Land that has a slope of more than 25% (steep-very steep) is only found in a small part of PT TTL (0.8%). These areas with steep slopes are around Bukit Bahagia (the middle part of PT TTL). Refer to Map 22.
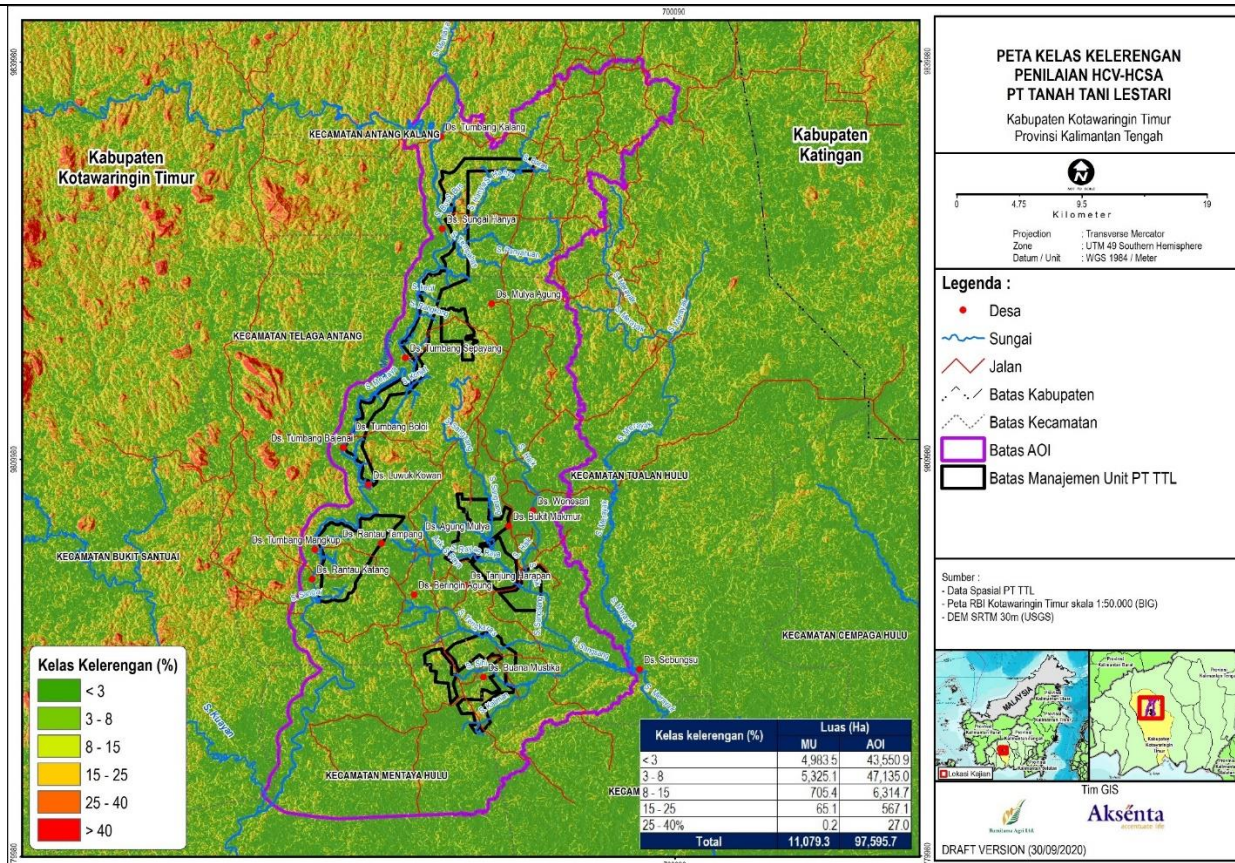
Map 22. Slope Class in PT Tanah Tani Lestari

Geological Conditions

Based on the geological map (Map 23), PT TTL consists of 4 geological formations:

1. Kuayan Formation (TRvk), 81%, is composed of andesite and basalt breccias, lava flows, tuffaceous sandstones, tuff, andesite and basalt breakthroughs. These rocks have been slightly heated to produce base metals, including gold.

2. Sepauh Tonalite Formation (Kls), 15%, is composed of granite rocks with an even texture, composed of diorite, tonalite, granodiorite to monzonite, breakthrough contact between granite pluton rocks and medium-level sloughed rocks.

3. Domaring (Tmpd), 3%, is composed of reef limestone, calcareous limestone, marl and lignite inserts; deposited in a littoral swamp environment, up to 1000 m thick, aged Late Miocene-Pliocene.

4. Intrusion a- Andesite, b= B (A, b), 2%, is an igneous rock composed of fine-grained minerals, and has a higher silica content than basalt and lower than rhyolite and felsite rocks

Hydrology Conditions

Based on the hydrological area (Map 24), the AOI is between the Mentaya Hulu sub-watershed and the Meraya/ Tualan sub-watershed. Both are segments within the Mentaya watershed. There are 32 rivers in AOI. The rivers that are quite large are the Mentaya River, Hanya River, Baras, Pengahuan, Konjat, Sangsang, Raya, Tengkaras, and Haik Rivers. The upstream part of the catchment area of these rivers, except for the Hanya River, is in PT Karya Makmur Bahagia (KMB) oil palm plantation area (with land cover and old plant of oil palm), while the catchment area of Hanya River is in PT Bangkit Giat Usaha Makmur (BGUM) oil palm plantation area.
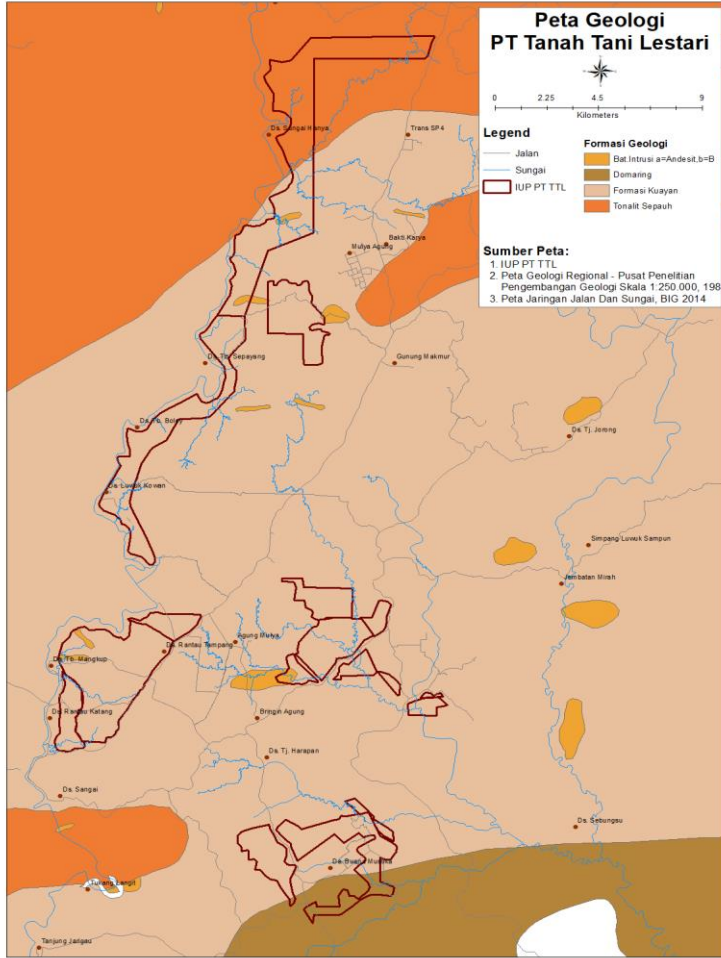
Map 23. Geological Map of PT TTL

Map 24. Hydrological Map of PT TTL

Source: Direktorat Jendral Geologi dan Sumber Daya Mineral, Bandung (1995)

Oil Palm Land Suitability Class

From the results of PT TTL's land suitability analysis, there are 5 land suitability classes with the distribution shown in the following table:

Table 44. Distribution of PT TTL's Land Suitability Class

Land Suitability	Limiting Factor(s)	Area (ha)
N-w	Territory Shape / Slope (%)	370.35
S3-k	Dry Month	5,573.01
S3-k-d	- Dry Month - Drainage Class	599.81
S3-k-nr	- Dry Month - Soil CEC	60.08
S3-k-w	- Dry Month - Territory Shape / Slope (%)	2,613.80
	Total Area	**9,217.05**
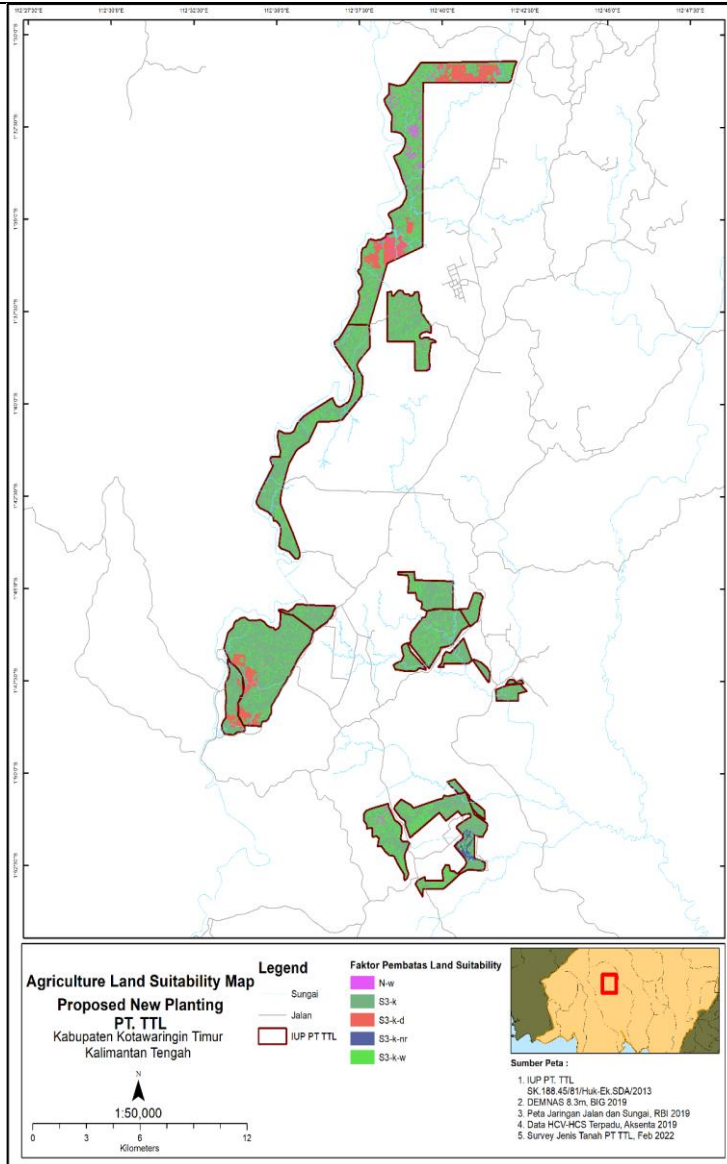
Map 25. Land Suitability Map of PT TTL

Section 7: Greenhouse Gas (GHG)

Greenhouse Gas emissions on the development plans area are calculated using the RSPO PalmGHG Calculator Version 4.0, as of July 2021, for New Development. This assessment carried out by Saeshaputi R.P and M. Vikky Arindi (internal Bumitama) on August – September 2022. PT TTL has submitted its GHG Report for New Planting, which includes plans on how to mitigate its emission to the Green House Gas Unit at RSPO and approved to proceed to the next step of NPP process on 21 November 2022.

1. **Data used**

The development and new planting for PT Tanah Tani Lestari will be based on the plantation permit (IUP), an area of 9,217 ha.

-   Land cover class and average carbon value;
-   Spatial data map of permit boundaries;
-   Map of Conservation Area, land cover, soil types and distribution of carbon stock map

2. Team Responsible For Developing Mitigation Plan

Leader : Hidayat Aprilianto

Members : Saeshaputi R.P

Muhammad Vikky Arindi

Table 45. Summary of Land Cover Class and Carbon Value

Land cover class	Average carbon value (tonne C/ha)	Physical description of the land cover
Low Density Forest (Hutan lahan rendah sekunder kerapatan sedang)	97.4	Secondary forest is found in areas with steep slopes. The remaining secondary forest in the study area is relatively protected from human disturbance due to difficult access, so that utilization in these areas is limited. However, repeated fires have also caused damage to the remaining forests.
Young Regenerating Forest (Hutan lahan rendah sekunder kerapatan rendah)	54.8	Shrub in the study area is found in areas with steep slopes. There are two types of shrub distribution in the study area, namely shrubs which are part of the expanse of secondary forest and shrubs that are scattered sporadically.
Shrub (Semak dan belukar)	16.1	Shrubs were found scattered throughout the study area. Shrubs are lands that are disturbed and in an early successional stage. In general, shrubs in the study area are land that has been cleared for fields and/or areas that have not been burned for a long time and have experienced succession. The dominant species found in the shrubs were penaga (*Callophylum grandifolium*), rubber (*Hevea brasiliensis*), and pulai (*Alstonia scholaris*). The diversity of species and evenness of tree species in the shrub is high.
Bushes (Semak) *Including bare land	0	Bushes were found in the form of land that had recently been cleared and/or burned. The bush area is dominated by weeds (*Pennisetum polystachyon*), rambang (*Scleria sumatrensis*), and ferns (*Stenochlaena palustris*). Seedlings of tree species were also found in the bush area, including ubar (*Syzygium* sp.), nyatoh (*Palaquium* sp.), and garung (*Macaranga gigantea*).

Table 46. Land covers conditions and land use of PT Tanah Tani Lestari

Description		Area	
		ha	%
A **Developed Area**		**3,791.88**	**41%**
Oil Palm	3,620.69		
Infrastructure	171.19		
B **Conservation Area**		**1,609.73**	**17%**
HCV	230.91		
HCS	44.00		
HCV Part of HCS	1,334.83		
C **Community Land**		**2,281.67**	**25%**
D **Settlement** (Pemukiman)		**60.15**	**1%**
E **Area Proposed for New Planting**		**1,473.61**	**16%**
Bare Land	72.52		
Shrubs	50.20		

Bushes	66.13		
Young Shrubs	1,284.76		
Total Area (A+B+C+D+E)		**9,217.04**	**100%**
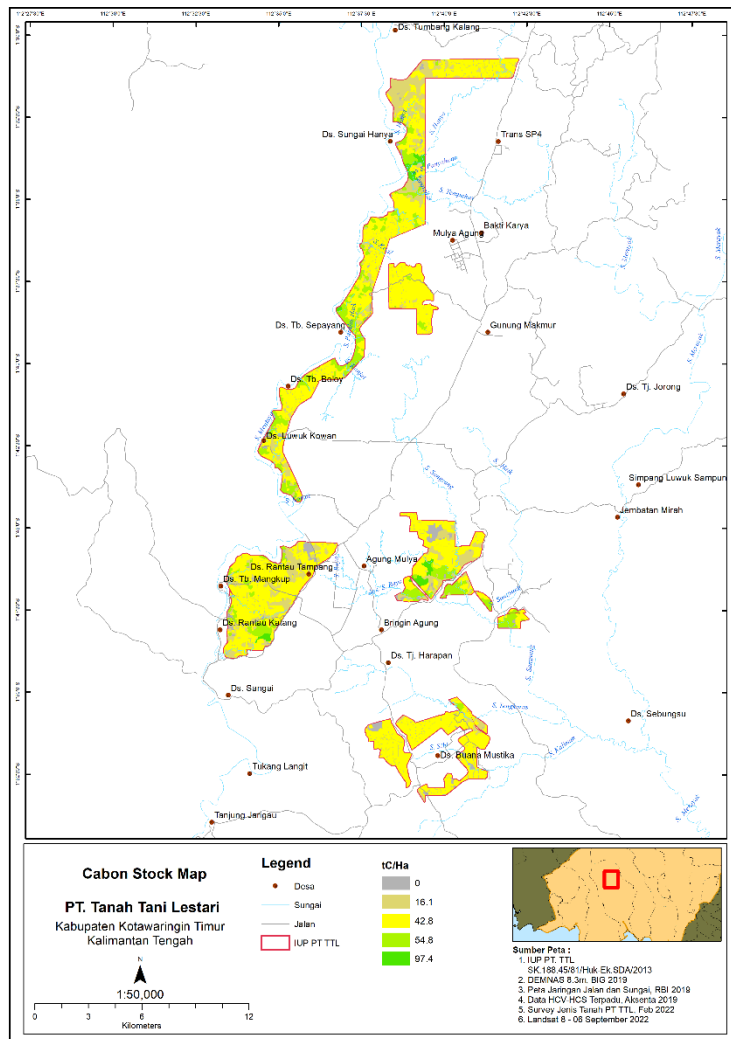
Map 26. Carbon Stock Map of PT TTL

Secondary data from company; trend of use of and sources of fertilizer, trend of FFB production, trend of mill extraction rate, trend of empty bunch and shells usage, trend of management of POME.

3. **Planting Cycles** : **25 years of planting cycles.**

4. **Dosage of fertilisers**
   a) TSP 2 kg/year/plant from Egypt
   b) MOP 2 kg/year/plant from Canada
   c) Urea 1.5 kg/year/plant from Bontang, East Kalimantan
   d) Kieserit 1.5 kg/ year/plant from Germany

5. Yield

FFB per year: 25 tonnes (average of Bumitama)

6. Processing

    a) Extraction CPO 24% (average of Bumitama's Mill)

    b) Extraction Kernel 5 % (average of Bumitama's Mill)

    c) Extraction Shell 4 % (2% to be used and 2% for sale)

7. Conservation Area

Conservation Area (integrated HCV- HCS) determined by the company are 1,609.73 ha. There is no peat land and there will be no land clearance in the Conservation Area.

8. Processing Maps

- Overlay between maps displaying permit boundaries, conservation area, land cover and soil types to get the potential area for planting.
- Cut and overlay maps based on block characteristics

9. Alternatives of land clearing

- Preparation of the alternatives of land clearing based on cut and overlay maps by block characteristic
- The alternatives of land clearing are based on Sustainability Policy and regulations, good agricultural practices, good management of mills, considering the carbon stock rate of the area.

Table 47. Description of Development Scenarios

Scenario 1	- No land clearance on planned conservation areas in community land; - Land clearance of all mineral land in any land cover; - No Plan both for mill and methane capture facilities; - Total planting plan = **1,473.61** ha.
Scenario 2	- No land clearance on conservation areas in community land; - Land clearance of all mineral land; - Avoid the shrubs area; - No Plan both for mill and methane capture facilities; - Total planting plan = **1,423.41** ha.
Scenario 3	- No land clearance on conservation areas in community land; - Land clearance of all mineral land; - Avoid shrubs and some of young shrubs area; - No Plan both for mill and methane capture facilities; - Total planting plan = **878.13** ha.

Description		Area	Scenario of Land Clearance		
		ha	Alt 01	Alt 02	Alt 03
A	**Developed Area**	**3,791.88**	3,791.88	3,791.88	3,791.88
B	**Conservation Area**	**1,609.73**			
	HCV	230.91	230.91	230.91	230.91
	HCS	44.00	44.00	44.00	44.00
	HCV Part of HCS	1,334.83	1,334.83	1,334.83	1,334.83
	Other Conservation Area	-	-	50.20	595.48
C	**Community Land**	**2,281.67**	2,281.67	2,281.67	2,281.67
D	**Settlement** (Pemukiman)	**60.15**	60.15	60.15	60.15
E	**Area Proposed for New Planting**	**1,473.61**			
	Bare Land	72.52	72.52	72.52	72.52
	Shrubs	50.20	50.20	-	-
	Bushes	66.13	66.13	66.13	66.13
	Young Shrubs	1,284.76	1,284.76	1,284.76	739.48
Total for Area Proposed for New Planting			**1,473.61**	**1,423.41**	**878.13**
Plan for Methane Capture (Flares)			**N**	**N**	**N**
Total Area (A+B+C+D+E)		**9,217.04**	**9,217.04**	**9,217.04**	**9,217.04**

Table 48. Resume of Development Scenarios

(All the Conservation Area are avoided to land clearance)
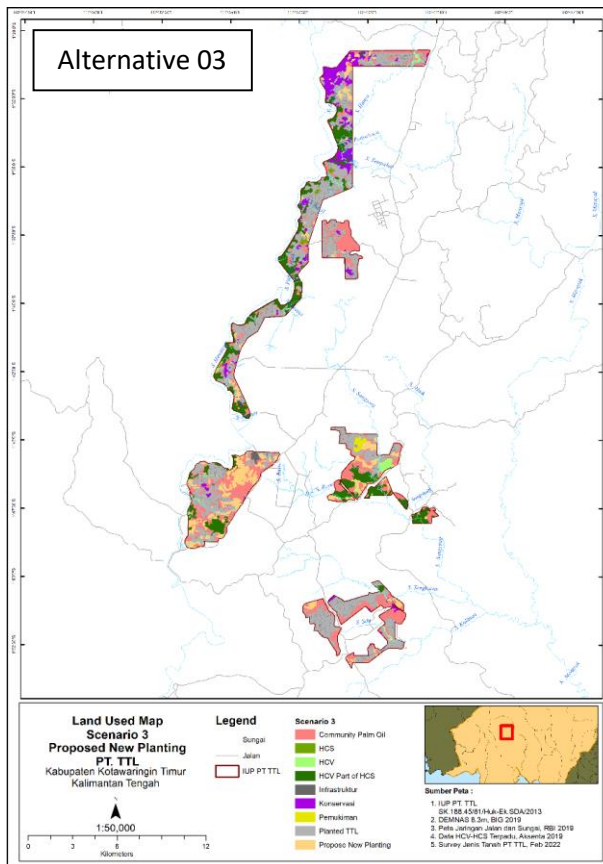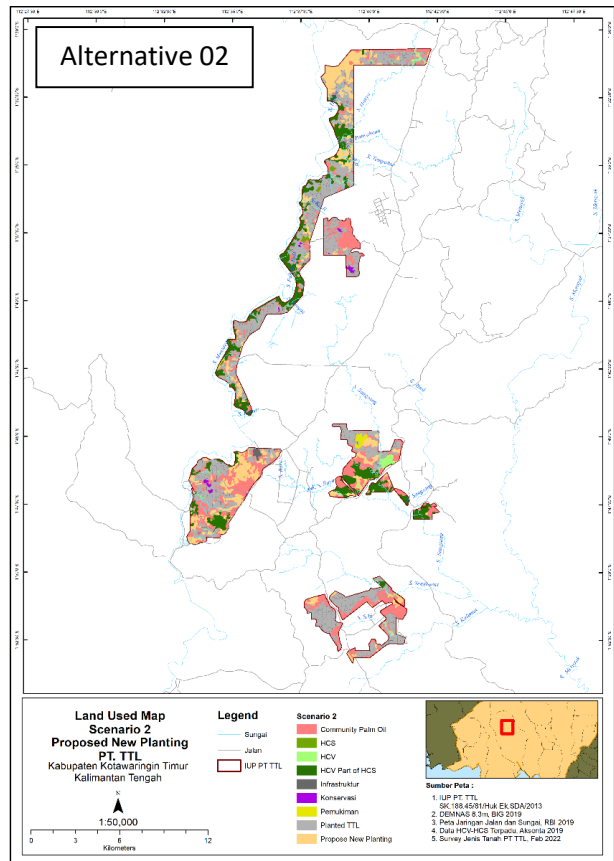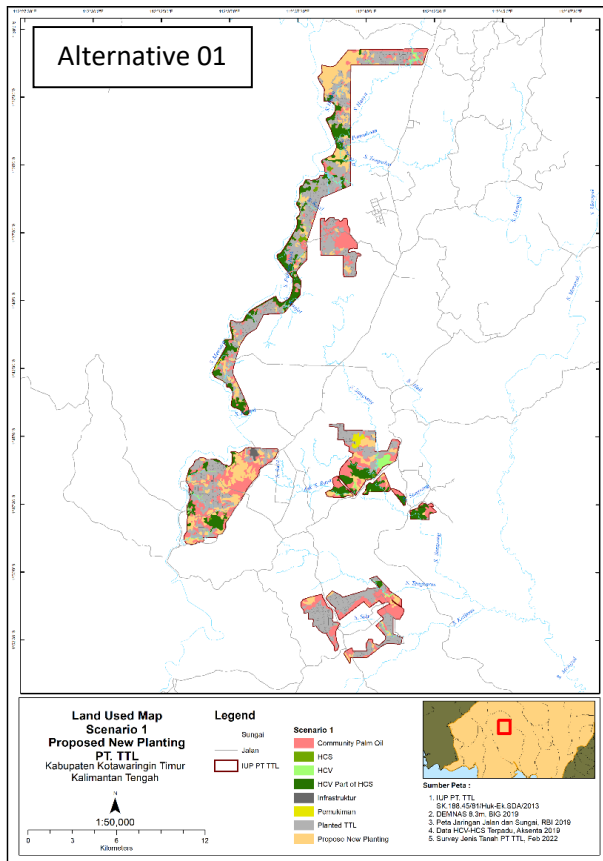
Map 27. Scenarios on Development Plan of PT TTL

10. Greenhouse Gas Emission Calculation

1) Entering the data from each of the alternatives into the Palm GHG Calculator, obtain the results of the carbon emissions per ton of CPO production

2) Choose an alternative plan for land clearance and GHG management which may not necessary be with the lowest carbon emission but rather an option which balances the goals of the company, the community, in line with the company's Sustainability Policy, meets with RSPO P&C also the Indonesian law and regulation and as well as for the general good for the environment.

Table 49. Summary of GHG calculations based on land clearing alternatives (in tCO$_2$e)

Alt.	Emisi (tCO2 e)						
	Land Clearing	Corp. Squest	Fertiliser	N2O	Fuel	Peat	Conservation
Alt 1	9,734.97	(13,076.34)	21.04	1,396.79	501.17	-	(3,035.00)
Alt 2	9,309.32	(12,630.89)	20.32	1,349.20	484.09	-	(3,160.00)
Alt 3	5,428.16	(7,792.25)	12.54	832.35	298.65	-	(3,160.00)

Table 50. Total Emission per ton of product based on the land clearing alternatives

Alt.	Total Field Emission tCO2e	t CO2e/ha	tCO2e/t FFB
1	(4,457.37)	(3.19)	(0.13)
2	(4,627.95)	(3.43)	(0.14)
3	(4,380.55)	(5.26)	(0.21)
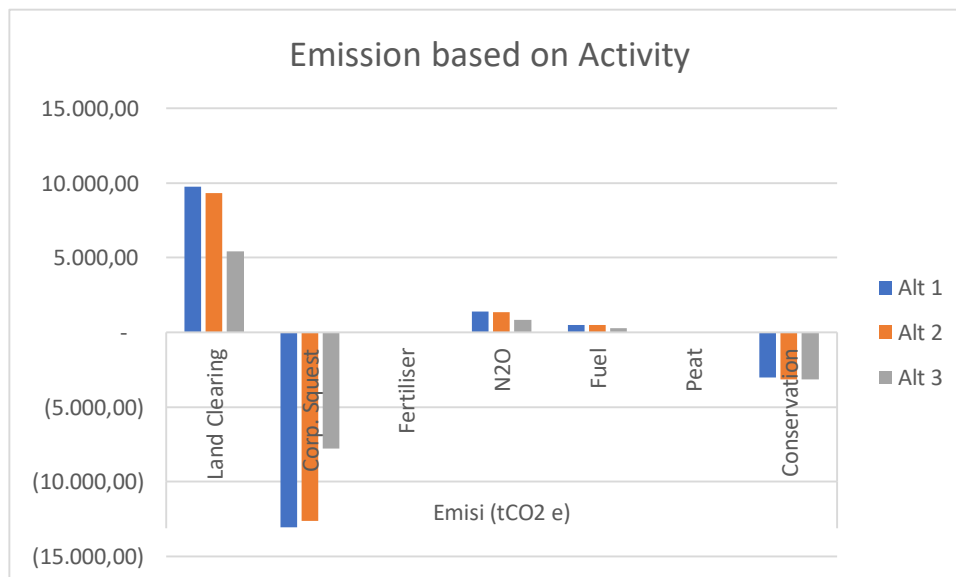
Figure 8. GHG Calculation based on land clearing alternatives

11. Choosing the Optimal Scenario for Land Clearance

Based on the GHG calculation, PT TTL will follow land clearance in accordance with the first alternative, with total emission produced from estate (plantation) – 4,457.37 tones CO_2e. While the emissions per ton of product (FFB) is – 0.13 tons CO_2e, with – 3.19 tones CO_2e/ha. This option was chosen by considering the wishes of the community during the FPIC process, to surrender their rubber plantation land/ fields (agroforestry) to be converted into oil palm plantations. The details are following:

1) No land clearance on planned conservation areas in community land;
2) Land clearance of all mineral land in any land cover;
3) No Plan both for mill and methane capture facilities;
4) Total planting plan = **1,473.61** ha, and will be divided into two years of development

Table 51. Two Years Planting Projection of Proposed New Planting Area at PT TTL

Description		Area	
		ha	%
A **Developed Area**		**3,791.88**	**41%**
Oil Palm	3,620.69		
Infrastructure	171.19		
B **Conservation Area**		**1,609.73**	**17%**
HCV	230.91		
HCS	44.00		
HCV Part of HCS	1,334.83		
C **Community Land**		**2,281.67**	**25%**
D **Settlement** (Pemukiman)		**60.15**	**1%**
E **Area Proposed for New Planting**		**1,473.61**	**16%**
2023	630.41		
2024	843.20		
Total Area (A+B+C+D+E)		**9,217.04**	**100%**

Map 28. Development Plan Area on PT TTL

Table 52. Carbon Value Summary of the Development Area

Potential Development Area		Area (ha)	tC/ha	tCO2e/ha	Total tCO2e
2023		**630.41**			
Bare Land	41.99		-	-	-
Shrubs	20.77		54.80	200.93	4,173.41
Bushes	18.53		16.10	59.03	1,093.91
Young Shrubs	549.11		16.10	168.67	92,617.31
2024		**843.20**			
Bare Land	30.53		-	-	-
Shrubs	29.43		54.80	200.93	5,913.25
Bushes	47.60		16.10	59.03	2,810.12
Young Shrubs	735.64		16.10	168.67	124,078.57
Total Area		**1,473.61**			

Section 8: Land Use Change Analysis (LUCA)

PT TTL has conducted and reported a Land Use Change Analysis to the RSPO and it was declared a Pass on 13 July 2016 (for 1st IUP) and 14 September 2020 (for 2nd IUP). The analysis is based on the HCV assessment conducted by PT TTL for the first time in May 2014. This LUC analysis was carried out by the Bumitama Internal Team. Remediation and compensation PT TTL have achieved approval and Satisfactory on 30 December 2022.

Name of Assessor:

Name	Expertise
Putra Wibowo Malau	Geospatial, Remote Sensing and Carbon Stock & Emission
Muhammad Vikky Arindi	Geospatial, Remote Sensing

Assessment Methodology

The methodology adopted to analyze the LUC analysis conducted by the company was by visually and statistically assessing the remote sensing images and other spatial data submitted by the company to RSPO. The first step of the assessment process was checking all the data submitted by the company for their completeness according to the LUC Reporting Checklist. When all required data are complete, the next step was visual inspection of the satellite imageries for their qualityi.e. cloud coverage, stripes in Landsat 7 images etc. Subsequently, the images were overlaid onto the geo-referenced boundary of the management unit, and visually verified if the satellite image/s cover the entire management unit and detecting for any irregularities.

The next step was verification of the area of the management unit. This was done by geometrical calculation on the boundary shapefile and cross checking it with the reporting template provided by the company. The land cover classes provided by the company were assessed by overlaying the land cover classes onto the pre-processed satellite imageries and visually inspect for their correctness. Geometrical calculation was also conducted to verify the area (ha) of the land cover classes and compared to the calculation conducted by the company. The verification of the vegetation coefficient was also conducted by crosschecking the vegetation coefficient classification with the land cover classes and vegetation coefficient definitions. The LUC analysis methodology was verified by visually inspecting the classification results and checking whether any irregularities is present in the data.
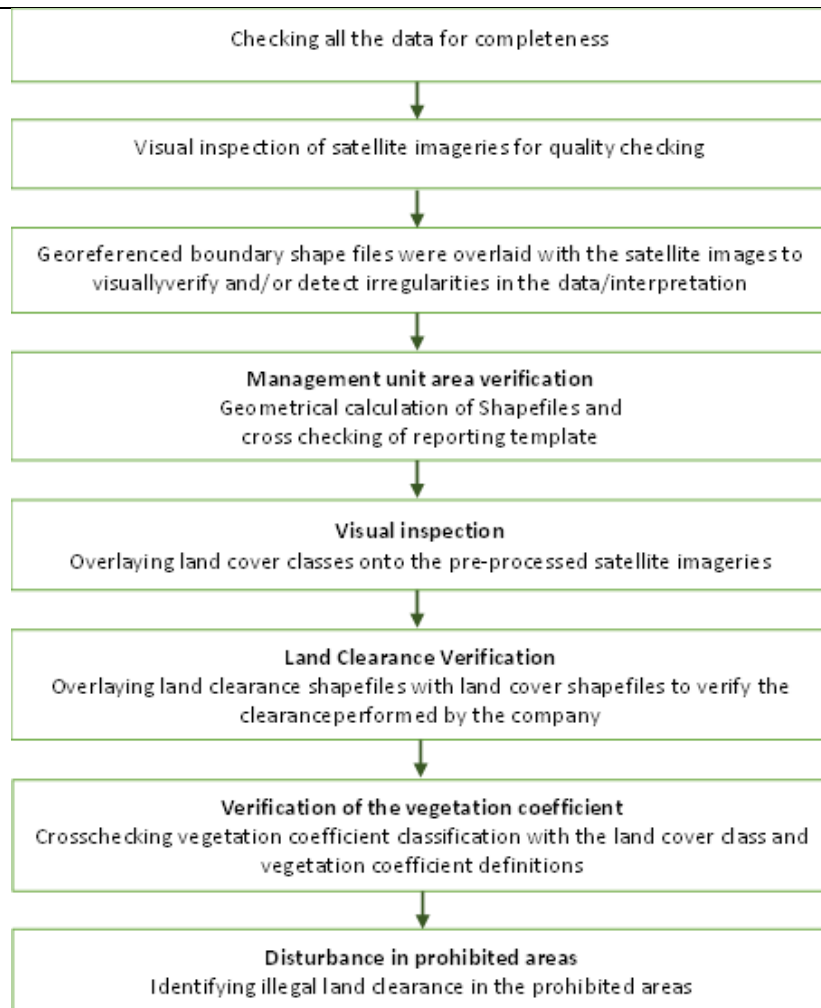
Flow Chart 1. The methods used to assess the LUC report submitted by the company

Data Used

Table 53. Time Series of Satellite Imagery used for LUCA

PT TTL			
Period	**Date of Acquisition**	**Cloud Cover**	**LUC**
Nov 2005 – Nov 2007	01-Jan-06	0% (stripped)	LC_2006
Dec 2007 – Dec 2009	10-Nov-08	0%	LC_2008
Jan 2010 – 9 May 2014, After the management unit acquired by Bumitama Agri.Ltd (becoming RSPO member)	12-Jan-10	5%	LC_2010
	27-Jan-14		LC_2014
9 May 2014 – 15 Nov 2018	30-Jan-15	0%	LC_2017
	29-Mar-17		
	30-Mar-18		
15 Nov 2018 - November 2020 (Latest satellite image used for ground truthing)	22-Nov-18	5%	LC_2019
	24-Jan-19	5%	
Latest Condition when Verification of NPP	6-Sep-22	5%	LC_2022
	4-Jul-22		
	28-Feb-22		

Land Use Change Calculation

Corporate land clearance is defined as land clearing for the purpose of oil palm plantation development and all facilities that support the sustainability of oil palm plantation activities. Whereas Non-corporate land clearance is defined as land clearing outside the company's objectives, including government projects that involve the community or to build public facilities, or by community members who act individually to support their livelihoods and without funding by any funding institution or organization even.

On satellite imagery, land clearing for corporate purposes can be clearly identified since the pre-assessment in the LUCA study was conducted. Corporate clearance has different land clearing characteristics than community clearing or causes of natural disasters. Land clearing is usually relatively broad, with a fast process, land clearing patterns and land cover depicted on satellite imagery are usually systematic / regular (one or more planting blocks can be seen on satellite images, not sporadic), and land clearing forms are usually square with a straight border. An additional feature that can indicate land clearing or degradation caused by clearing by corporations is the existence of block roads.

Table 54. Historical Land Use Change in each cut-off date (in hectares), based on IUP

Land Cover	01-Jan-06	10-Nov-08	12-Jan-10	27-Jan-14	29-Mar-17	24-Jan-19	06-Sep-22
Secondary Forest	1,098.50	1,041.17	392.53	392.53	156.23	156.23	154.04
Shrubs	7,373.83	7,293.12	7,082.27	7,082.27	1,375.86	1,214.74	1,110.59
Young Shrubs	327.44	529.61	146.35	146.35	3,335.58	1,671.62	1,474.64
Bushes	57.04	0.95	241.85	241.85	28.48	89.27	95.00
Bare Land	48.44	40.39	591.76	591.76	327.37	267.14	319.56
Water Body	3.23	3.23	3.23	3.23	3.23	3.23	3.23
Oil Palm	308.56	308.56	759.05	759.05	3,990.30	5,814.82	6,059.98
Grand Total	**9,217.04**	**9,217.04**	**9,217.04**	**9,217.04**	**9,217.04**	**9,217.04**	**9,217.04**

Table 55. Raw land covers data per period on the potential development area

Period November 2005 - November 2007- in hectares								
Corporate								
Land Cover	10-Nov-08							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	-	-	-	-	-	-	-	-
Shrubs	-	-	-	-	-	-	-	-
Young Shrubs	-	-	-	-	-	-	-	-
Bushes	-	-	-	-	-	-	-	-
Bare Land	-	-	-	-	-	-	-	-
Water Body	-	-	-	-	-	-	-	-
Oil Palm	-	-	-	-	-	-	-	-
Grand Total	-	-	-	-	-	-	-	-
Non Corporate								
Land Cover	10-Nov-08							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	1,041.17	0.46	52.25	-	4.63	-	-	1,098.50
Shrubs	-	7,289.60	84.15	-	0.07	-	-	7,373.83
Young Shrubs	-	3.06	324.13	-	0.25	-	-	327.44
Bushes	-	-	56.09	0.95	-	-	-	57.04
Bare Land	-	-	13.00	-	35.45	-	-	48.44
Water Body	-	-	-	-	-	3.23	-	3.23
Oil Palm	-	-	-	-	-	-	308.56	308.56
Grand Total	1,041.17	7,293.12	529.61	0.95	40.39	3.23	308.56	9,217.04

Period December 2007-December 2009- in hectares

Corporate

Land Cover (10-Nov-08)	12-Jan-10							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	-	-	-	-	-	-	-	-
Shrubs	-	-	-	-	-	-	-	-
Young Shrubs	-	-	-	-	-	-	8.16	8.16
Bushes	-	-	-	-	-	-	-	-
Bare Land	-	-	-	-	-	-	0.28	0.28
Water Body	-	-	-	-	-	-	-	-
Oil Palm	-	-	-	-	-	-	308.56	308.56
Grand Total	-	-	-	-	-	-	316.99	316.99

Non Corporate

Land Cover (10-Nov-08)	12-Jan-10							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	392.53	426.31	31.42	145.89	12.71	-	32.31	1,041.17
Shrubs	-	6,469.38	32.31	70.71	447.09	-	273.63	7,293.12
Young Shrubs	-	186.59	82.50	19.78	96.47	-	136.12	521.46
Bushes	-	-	-	0.95	-	-	-	0.95
Bare Land	-	-	0.12	4.51	35.49	-	-	40.12
Water Body	-	-	-	-	-	3.23	-	3.23
Oil Palm	-	-	-	-	-	-	-	-
Grand Total	392.53	7,082.27	146.35	241.85	591.76	3.23	442.06	8,900.05

Period January 2010-May 2014- in hectares

Corporate

Land Cover (12-Jan-10)	27-Jan-14							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	-	-	-	-	-	-	-	-
Shrubs	-	-	-	-	-	-	-	-
Young Shrubs	-	-	-	-	-	-	-	-
Bushes	-	-	-	-	-	-	-	-
Bare Land	-	-	-	-	-	-	374.66	374.66
Water Body	-	-	-	-	-	-	-	-
Oil Palm	-	-	-	-	-	-	442.05	442.05
Grand Total	-	-	-	-	-	-	816.72	816.72

Non Corporate

Land Cover (12-Jan-10)	27-Jan-14							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	160.43	1.63	0.07		8.33	-	222.07	392.53
Shrubs	-	4,060.41	828.66	0.17	71.69	-	2,121.34	7,082.27
Young Shrubs	-	92.83	2.76	0.67	0.70	-	49.38	146.35
Bushes	-	-	-	64.42	9.90	-	167.52	241.85
Bare Land	-	-	-	117.89	98.72	-	0.49	217.10
Water Body	-	-	-	-	-	3.23	-	3.23
Oil Palm	-	-	-	-	-	-	317.00	317.00
Grand Total	160.43	4,154.87	831.49	183.15	189.34	3.23	2,877.80	8,400.32

Period 09 May 2014 - 15 November 2018 - in hectares

Corporate

Land Cover (27-Jan-14)	29-Mar-17							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	-	-	-	-	-	-	-	-
Shrubs	-	-	-	-	-	-	-	-
Young Shrubs	-	-	-	-	-	-	-	-
Bushes	-	-	-	-	-	-	-	-
Bare Land	-	-	-	-	-	-	-	-
Water Body	-	-	-	-	-	-	-	-
Oil Palm	-	-	-	-	-	-	2,816.87	2,816.87
Grand Total	-	-	-	-	-	-	2,816.87	2,816.87

Non Corporate

Land Cover (27-Jan-14)	29-Mar-17							
	Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
Secondary Forest	156.23	-	0.01	-	-	-	4.20	160.43
Shrubs	-	1,375.86	2,469.48	-	100.69	-	208.84	4,154.87
Young Shrubs	-	-	712.85	15.42	26.94	-	76.28	831.49
Bushes	-	-	153.24	13.06	12.46	-	4.40	183.15
Bare Land	-	-	-	-	187.28	-	2.06	189.34
Water Body	-	-	-	-	-	3.23	-	3.23
Oil Palm	-	-	-	-	-	-	877.65	877.65
Grand Total	156.23	1,375.86	3,335.58	28.48	327.37	3.23	1,173.43	6,400.17

Periode 15 Nov 2018 - November 2020 - in hectares

Non Corporate

Land Cover		24-Jan-19							
		Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
29-Mar-17	Secondary Forest	-	-	-	-	-	-	-	-
	Shrubs	-	-	-	-	-	-	-	-
	Young Shrubs	-	-	-	-	-	-	-	-
	Bushes	-	-	-	-	-	-	-	-
	Bare Land	-	-	-	-	-	-	-	-
	Water Body	-	-	-	-	-	-	-	-
	Oil Palm	-	-	-	-	-	-	43.18	43.18
	Grand Total	-	-	-	-	-	-	43.18	43.18

Non Corporate

Land Cover		24-Jan-19							
		Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
29-Mar-17	Secondary Forest	156.23	-	-	-	-	-	-	156.23
	Shrubs	-	1,203.37	139.06	-	9.82	-	23.61	1,375.86
	Young Shrubs	-	11.37	1,522.68	86.06	15.93	-	1,699.54	3,335.58
	Bushes	-	-	-	3.22	21.50	-	3.76	28.48
	Bare Land	-	-	9.88	-	219.89	-	97.61	327.37
	Water Body	-	-	-	-	-	3.23	-	3.23
	Oil Palm	-	-	-	-	-	-	3,947.12	3,947.12
	Grand Total	156.23	1,214.74	1,671.62	89.27	267.14	3.23	5,771.63	9,173.86

Latest Condition when Verification of NPP

Non Corporate

Land Cover		6-Sep-22							
		Secondary Forest	Shrubs	Young Shrubs	Bushes	Bare Land	Water Body	Oil Palm	Grand Total
24-Jan-19	Secondary Forest	154.04	-	2.19	-	-	-	-	156.23
	Shrubs	-	1,110.58	29.37	0.86	26.07	-	47.86	1,214.74
	Young Shrubs	-	0.00	1,440.41	1.69	51.54	-	177.98	1,671.62
	Bushes	-	-	2.68	77.35	7.90	-	1.34	89.27
	Bare Land	-	-	-	15.10	234.05	-	17.99	267.14
	Water Body	-	-	-	-	-	3.23	-	3.23
	Oil Palm	-	-	-	-	-	-	5,814.82	5,814.82
	Grand Total	154.04	1,110.59	1,474.64	95.00	319.56	3.23	6,059.98	9,217.04

Land Cover
- 01 Hutan
- 02 Belukar
- 03 Semak Belukar
- 04 Semak
- 06 Lahan Terbuka
- 07 Badan Air
- 08 Kelapa Sawit

Jan 2006

Oct 2008

Dec 2010

Jan 2019

March 2017

Jan 2014

Mosaic Image Apr–Sept 2022
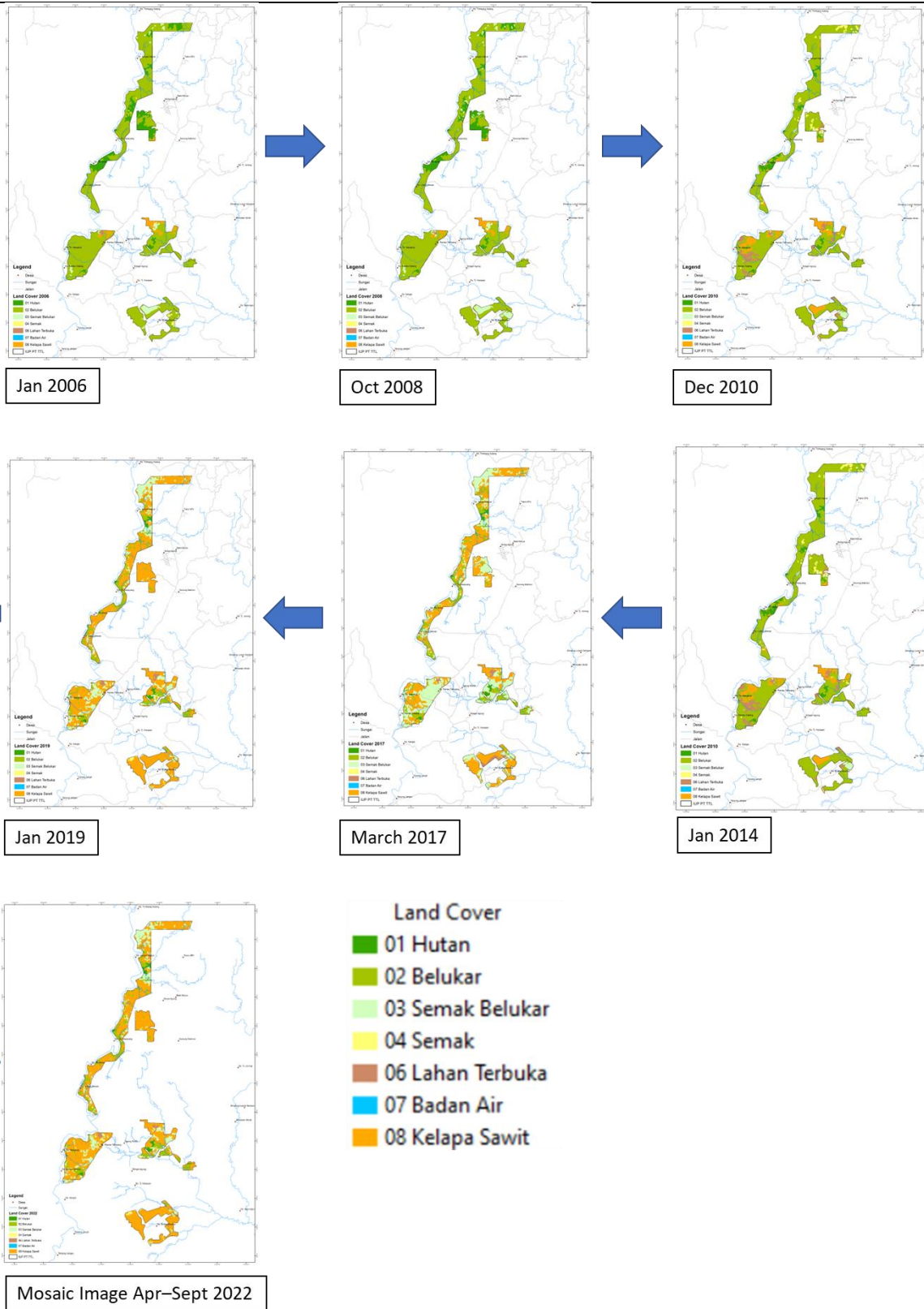
Map 29. Time Series LUC Analysis on the potential development area
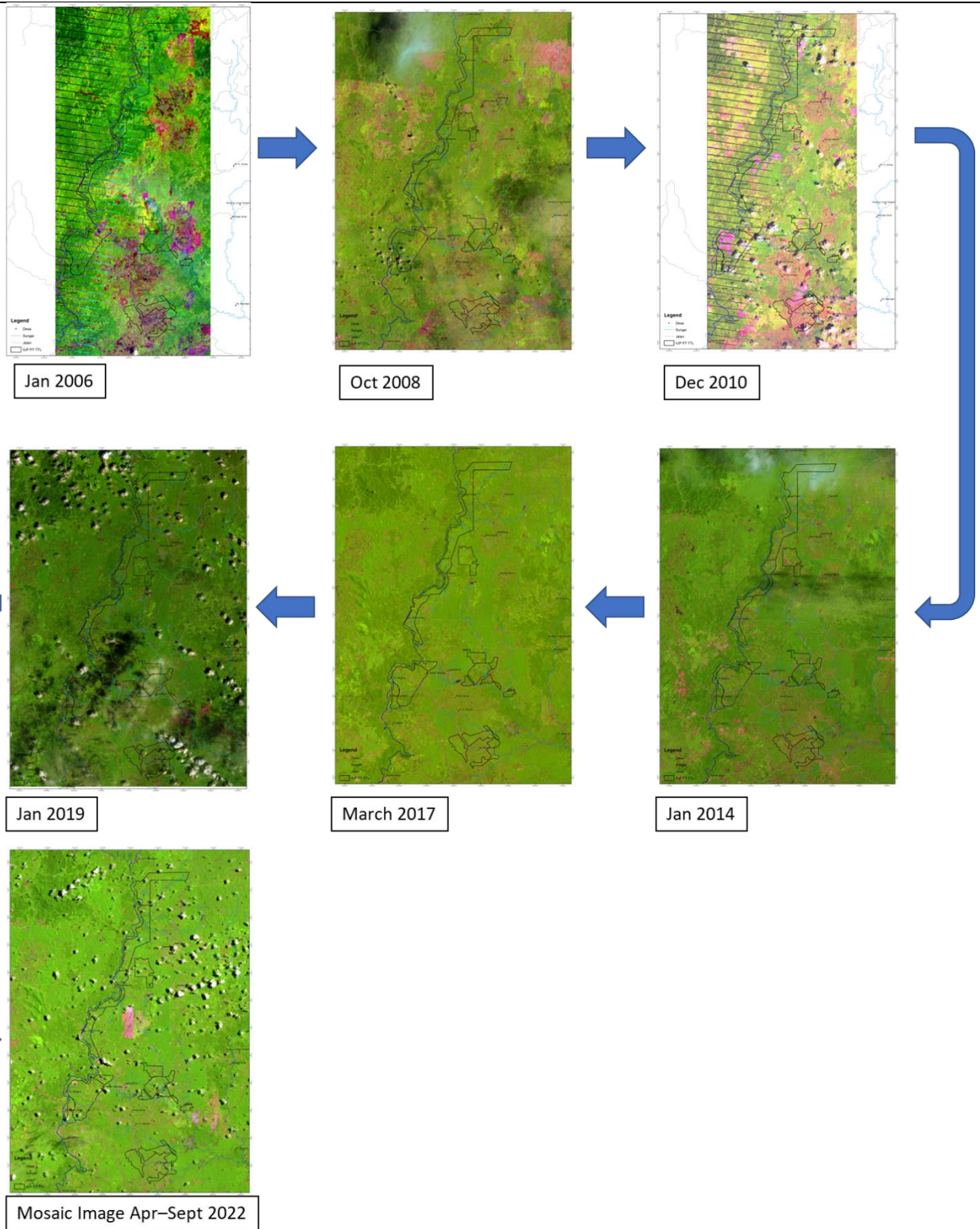
Map 30. Time Series LUC Analysis on the potential development area

Section 9: Conclusions

PT Tanah Tani Lestari as a subsidiary of Bumitama Agri Ltd., which is a member of the RSPO, conducts plantation operations with a commitment to the Bumitama Sustainability Policy and adheres to the required sustainability principles.

This study and assessment in the context of PT TTL's plantation operations has been carried out based on the prevailing laws and regulations in Indonesia, as well as international regulations that have been ratified. The study was conducted using a standard toolkit that has been recognized/endorsed by global institutions and the RSPO.

Issue(s) to be prioritized:

- Land tenure by the community is still high. This requires more concern to be able to achieve company targets, both in developing plantation, other land management and partnering with the community
- The quality of local community resources in terms of developing potential alternative livelihoods and meeting the needs of local workers.

Management and Monitoring of recommendations for integrated HCV-HCS assessment, Social Impact, Land Management, and emissions, in detail, including achievement targets and timelines are written in the Summary of Integrated Management Plan document.

Section 10: Confirmation of Report

This document is the summary of assessment result on Environment Impact Assessment (EIA), Social Impact Assessment (SIA), Integrated High Conservation Value (HCV) – High Carbon Stock HCS), Soil and Topography Survey and Land Use Change Analysis (LUCA) in PT Tanah Tani Lestari – District of Kotawaringin Timur, Central Kalimantan Province and has been approved by the Management. This Assessment result will be applied as one of the guidelines in managing oil palm plantation.

Date of Completion	12 December 2022
Signature	
Name	**Martin Mach**
Position	**Deputy of Corporate Sustainability & CSR**
Signature	
Name	**Johan Sukardi**
Position	**Director**