

ASSESSMENT SUMMARIES and MANAGEMENT PLANS
PT Damai Agro Sejahtera
Sub-District of Nanga Tayap & Matan Hilir Utara, District of Ketapang
West Kalimantan Province

1. Preliminary

1.1 Executive Summary

PT Damai Agro Sejahtera (PT DAS) is one of the oil palm plantation companies operating in Ketapang - West Kalimantan. The location permit of PT DAS is covering 9,438 ha which have been opened by the previous management since 2004, then was taken over by Bumitama in 20 December 2016.

Location permit for development area was obtained in 10 Januari 2016 with the Decree of the Ketapang Regent No. 27/PEM/2016, regarding the granting of Location Permit of Oil Palm Plantation on behalf of PT Damai Agro Sejahtera located in Sub-District of Nanga Tayap and Sub-district of Matan Hilir Utara, West Kalimantan Province.

In line with Bumitama Sustainability Policy and the RSPO New Planting Procedures which came into force beginning 1 January 2010, PT DAS had recently conducted the Social Environment Impact Assessment (SEIA/ AMDAL), High Conservation Value (HCV) identification, Social Impact Assessment (SIA), Carbon Stock Assessment and Land Use Change Analysis (LUCA), HCS and soil delineation assessment of this area so that Bumitama can ensure no HCV, HCS, and peat area will be cleared as per the Sustainability Policy of Bumitama and to be in compliance to the RSPO P&C.

The HCV & HCS assessments were conducted from 10 March to 20 May 2017 by Gagas Dinamiga Aksenta (Aksenta) which the key consultants conducting these assessments who have been approved by HCVRN Assessor Licensing Scheme, and the report has been declared satisfactory by HCVRN Quality Panel on 18 October 2019.

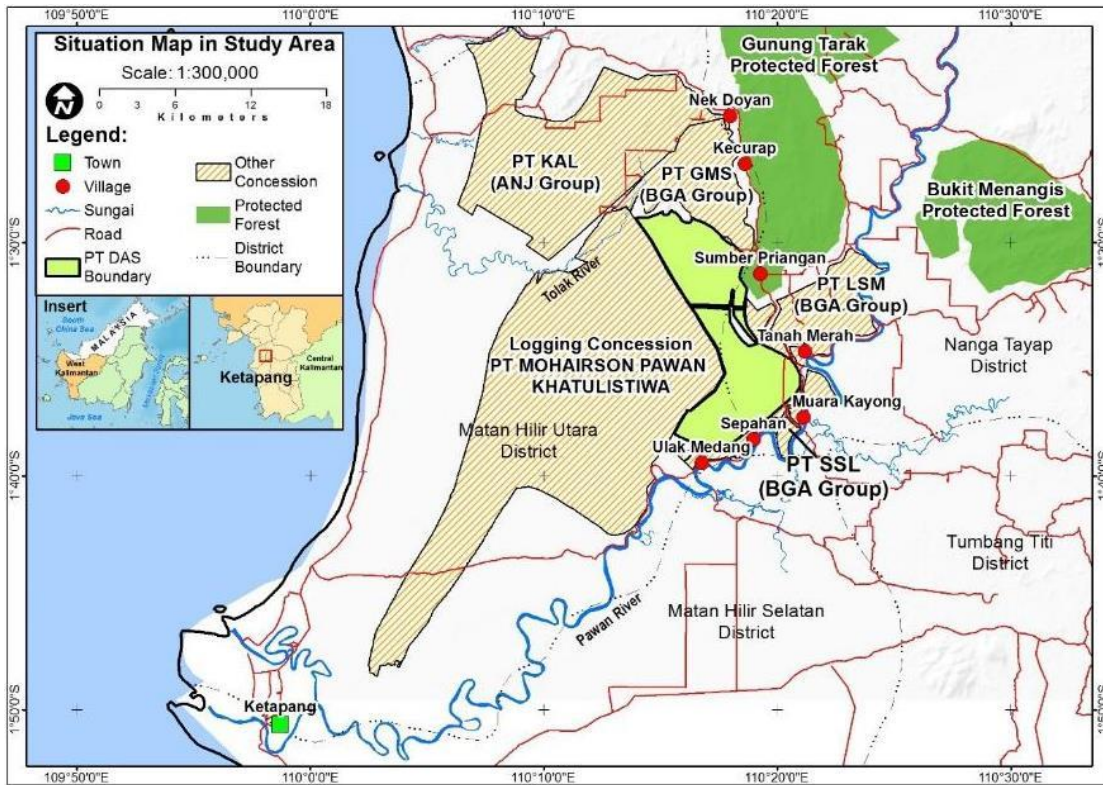
The results of the HCV assessment and LUC analysis had shown that there is no primary forest in the concession of PT DAS. The land cover is dominated by the secondary forest (51.9%), oil palm (18.3%), and bushes (12.8%). As for potential HCV areas, there is 5 types of HCV were identified on the area of PT DAS. These are HCV 1, 2, 3, 4 and 5, with the total area **8,577.4** ha, including the HCVMA (90.8% of Location Permit Area). The important elements for HCV area are the peat swamp forest and the riparian of the river. The HCV areas inside the IUP will be included in the monitoring and socialization plan with the local communities.

The results of the Social Impact Assessments (SIA) have shown that the company's development of oil palm plantation has positive impacts toward local livelihood and the society's social sustainability. Generally, the communities support the development of oil palm plantation by PT DAS. One of the main expectations of the people is the creation of jobs for the local community, transparency and clarity of plasma management, the development and improvement of social facilities/ public, business opportunity or cooperation with the company.

1.2 Scope of SEIA and HCV Assessment

Organizational Information/ Contac Person

Company Name	:	PT Damai Agro Sejahtera (DAS)
Company Address	:	Jalan Melawai Raya No. 10, South Jakarta Jakarta- Indonesia, 12160
Type of business	:	Oil Palm Plantation
Capital Status	:	Foreign Investment (<i>Penanaman Modal Asing, PMA</i>)
RSPO Membership Number	:	1-0043-07-000-00
Location of Plantation	:	Hamlet of Muara Kayong and Sepahan, Village of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara District of Ketapang, West Kalimantan
Geographical Location	:	1°28'38.18" - 1°38'45.91"S 110°13'56.70" - 110°20'59.10" E See Map 1
Surrounding Entities	North	: Plantation Area of PT Gemilang Makmur Sejahtera
	South	: Plantation Area of PT Sejahtera Sawit Lestari
	West	: PT Mohairson Pawan Khatulistiwa
	East	: Plantation Area of PT Ladang Sawit Mas
Contact person	:	Lim Sian Choo
	Phone	: +62-21-27838200
	Fax	: +62-21-72798665
	Email	: lim.sian.choo@bumitama.com
Website	:	www.bumitama-agri.com



Map 1: Location of PT DAS in Sub-district of Nanga Tayap & Matan Hilir Utara, District of Ketapang, West Kalimantan Province

1.3 List of Legal, Regulatory Permits and Property Deeds

Table 1: Types of permits and recommendations PT DAS

No.	Licenses and Recommendations	Issued by	Number & Date	Note
1	Deed of Establishment	Farahdiba, SH.	No: 6 Dated: 15 November 2013	-
2	Last Changes of deeds	Muhamat Hatta, SH	No: 29 Dated: 20 December 2016	-
3	Approval of Last Changes	Ministry of Justice & Human Rights	AHU-AH.01.03-0110307 Dated: 21 December 2016	-
4	Land Information Letter for Oil Palm Plantation	Head of Ketapang District	525/704/DPU-E Dated: 10 December 2015	± 9,436 Ha
5	Permitted Area (Izin Lokasi)	Head of Ketapang District	27/PEM/2016 Dated: 08 Januari 2016	± 9,436 Ha
6	Status/Fungsi Kawasan Hutan area Perkebunan Kelapa Sawit PT DAS	Forestry Agency of West Kalimantan Province	105.2/Dishut-II/Ppk/2016 Dated: 20 Januari 2016	
7	SEIA Recommendations (Ijin Kelayakan Lingkungan)	Head of Ketapang District	525/KLH-B/2016 Dated: 03 August 2016	9,436 ha 60 ton TBS/ jam
8	Environmental Permit (Ijin Lingkungan)	Head of Ketapang District	526/KLH-B/2016 Dated: 04 August 2016	9,436 ha 60 ton TBS/ jam
9	Plantation Business Permit	Head of Ketapang District	576/DISBUN-D/2016 Dated: 25 August 2016	9,436 ha 60 ton TBS/ jam
10	Location Permit Validity Period	Head of Ketapang District	100/498/PEN Dated: 21 May 2021	

1.4 Historical of Land

The assessment area is a former logging area of PT Marsela, a logging company that operated from 1990 to 1997. After the company stopped operating, logging was still being carried out by the local community. Massive logging activities were carried out by local communities from 1999 - 2004, there were still found until the HCV assessment was carried out.

The use of land for oil palm plantations began in 2004 by the company PT Ketapang Mandiri (a Regional-Owned Company formed by the Government of the Ketapang Regency) in collaboration with PT Golden Young Plantation (PT GYP). Based on the analysis of acquisition satellite image 03-04-2004 (please refer to Map 2), found some open land (7,135.0 ha) to the east of the PT DAS Location Permit area, the land clearing was allegedly carried out by PT KM / PT GYP as oil palm plantation land. Meanwhile, the use of land by local communities as an agricultural area was not found in the assessment area. The use of land in the assessment area, especially the PT DAS Location Permit area by local communities is relatively limited, this is due to the fact that most of the area is peat swamp and sand (marginal land) dominated by secondary forest cover with an area of 7,135.0 ha.

In 2009 the Government of Ketapang District through Decree No. 245 of 2009 decided that there was a reduction on the area of PT Golden Youth Plantation.

PT DAS obtained the initial permit through a Decree of the Regent of Ketapang Regency Number: 27 / PEM / 2016, January 18, 2016. The condition of land cover on the area of the Location Permit at that time was dominated by secondary forest (5,763.1 ha) and oil palm (1,692, 7 ha), please refer to Map 3.

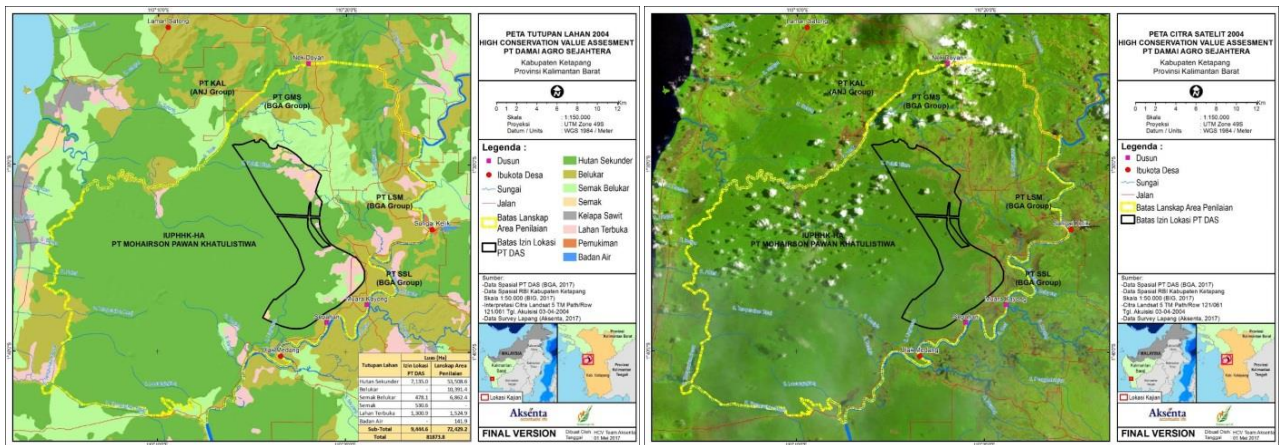
Analysis of satellite imagery (Landsat 8; acquisition date: 16 December 2016) shows that there was a 1,275.3 ha land clearing in the PT DAS Location Permit area before it was acquired by Bumitama on December 22, 2016 (please refer to Map 4).

At the time of the HCV assessment, the PT DAS Location Permit area was dominated by 4,906.6 ha of secondary forest, 1,730.7 ha of oil palm, and 1,196.2 ha of open land (please refer to Map 5).

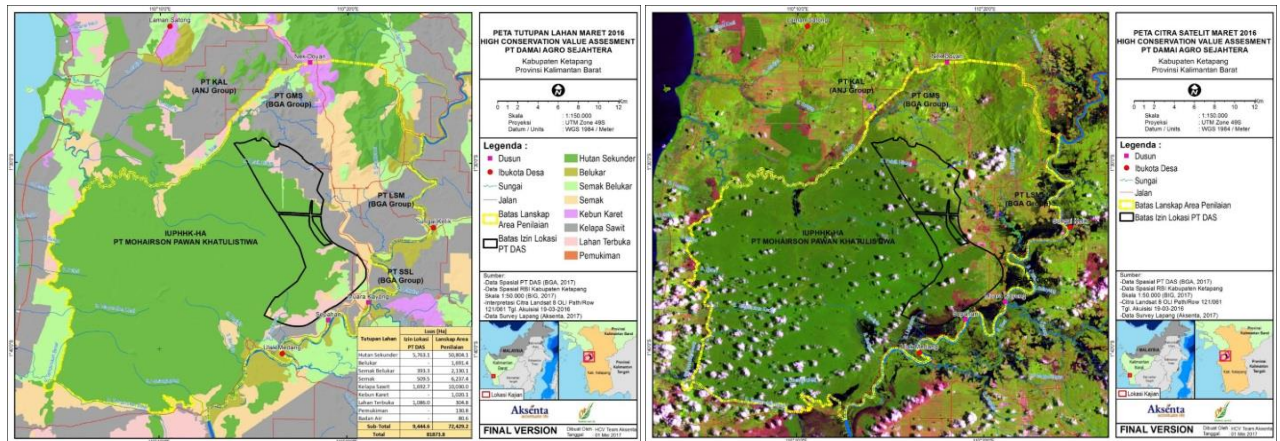
Bumitama Agri Ltd stopped the land clearing and began preparing New Planting Procedure (NPP) documents since December 2016. PT DAS began to disseminate planned activities to the community hamlets of Muara Kayong, Sepahan and Nek Doyan. In line with the socialization activities, PT DAS started to carry out the process of planting compensation to grow on community land, without carrying out physical construction, including not building new plantation facilities.

Table 2: Historical Land Use Changes in each cut-off date

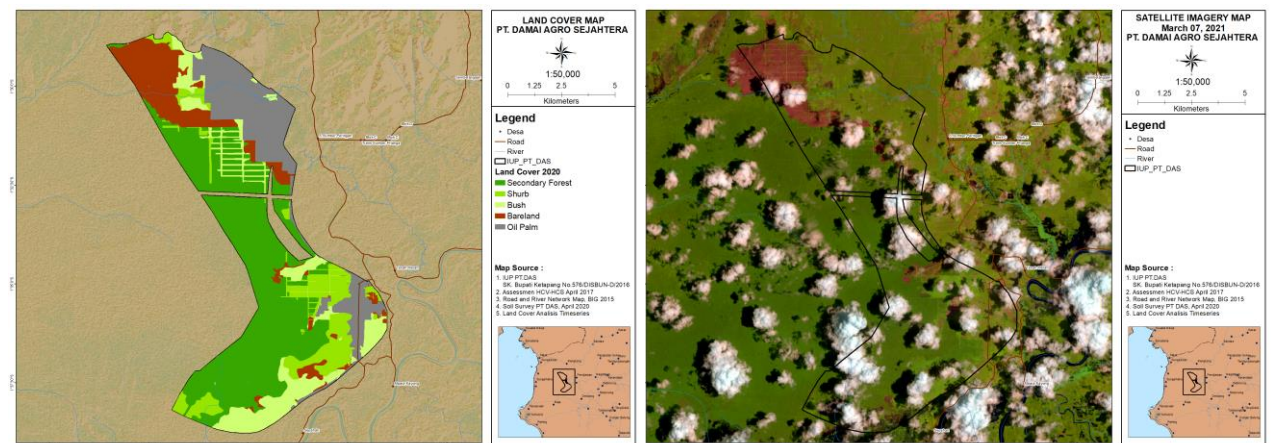
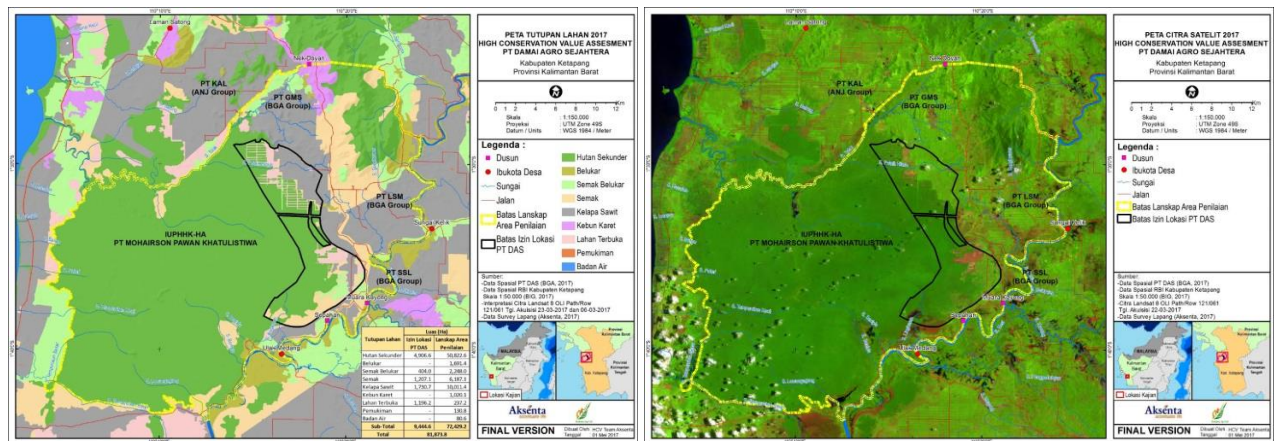
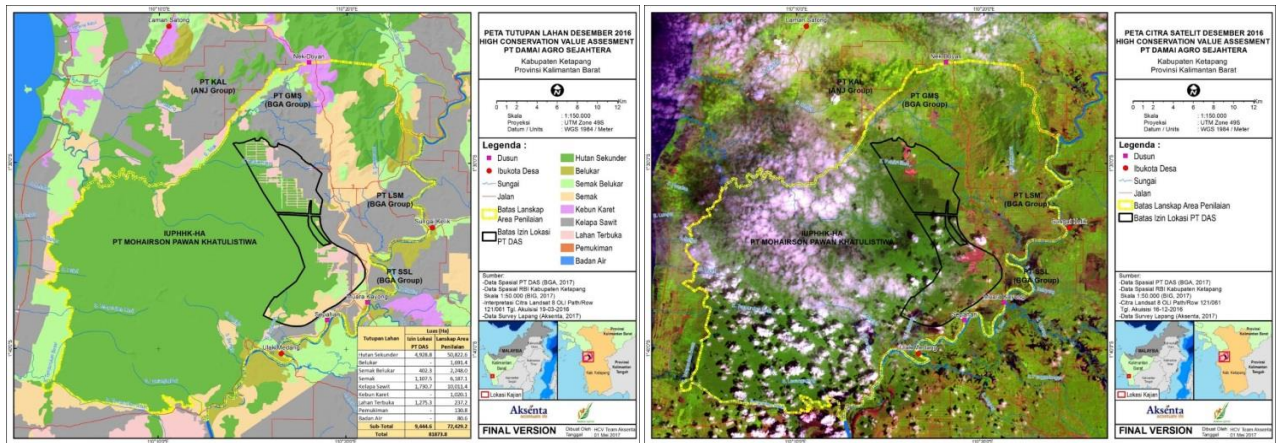
Land Cover	Nov 2005	Dec 2007	Jan 2010	May 2014	Dec 2016	March 2017
Secondary Forest (<i>hutan sekunder</i>)	7135.0	6671.0	6546.9	6488.4	4898.9	4898.9
Young Shrub (<i>semak belukar</i>)	478.1	390.1	338.2	368.2	488.0	488.0
Shrub (<i>belukar</i>)	530.6	252.4	485.6	500.1	1071.0	1070.0
Open Land (<i>lahan terbuka</i>)	1300.9	524.3	457.1	434.2	1256.9	1256.9
Oil Palm (<i>kelapa sawit</i>)	0	1606.6	1616.8	1653.6	1730.7	1730.7

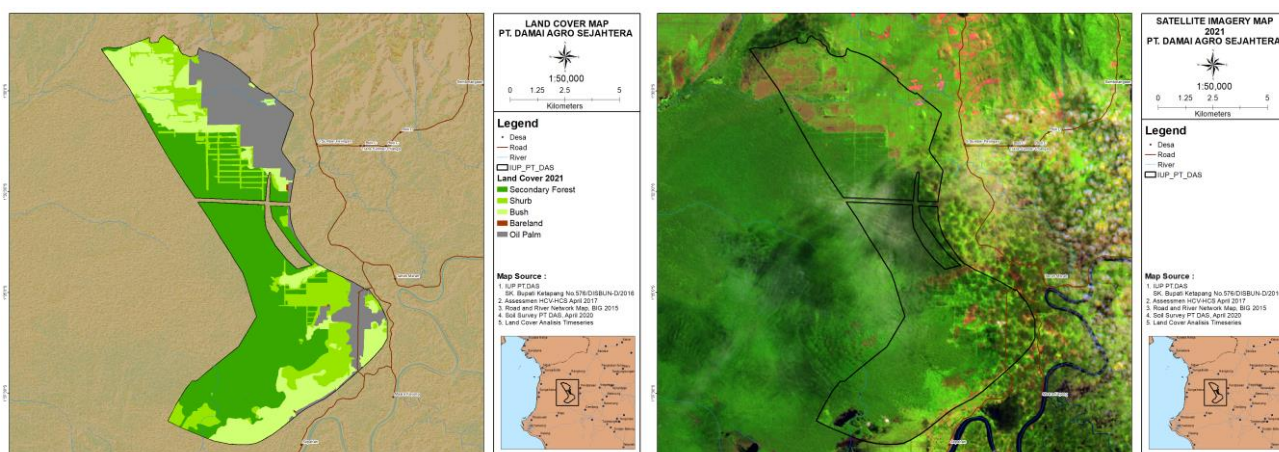


Map 2: Land Cover and Satellite Image Landsat 5 on 2004, before the existing of PT DAS



Map 3: Land Cover and Satellite Image on March 2016, when PT DAS obtained a Location Permit





Map 7: Land Cover and Satellite Image on July 2021, latest condition when the NPP field verification is carried out

1.5 Area and time-plan for new plantings

The proposed new planting area by PT DAS is in the location of the new Plantation Business Permit (Izin Usaha Perkebunan, IUP) which have been agreed by the owners of the land 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).

Table 3: The summarized of land use and time-plan for new plantings

ICLUP Indicative	Land Used Definitive Proposed PT DAS	Width of Area (ha)			
			Ha		%
Planted Area				372.40	4
Conservation Area				8,577.40	91
HCV			3,642.66		
HCS overlay with HCV area			1,516.14		
HCVMA No Go Area			703.00		
HCVMA Go Area			2,715.60		
	Propose for Development (1)		241.51		
	HCV		11.06		
	HCVMA		491.23		
	HCVMA Planted		1,343.70		
	Other Conservation Area		362.71		
	Food Source		265.38		
Non-Conservation Area				494.80	5
	Propose for Development (2)		364.94		
	Area Konservasi lain		113.37		
	Food Source		16.55		
Total Area				9,444.60 *	100

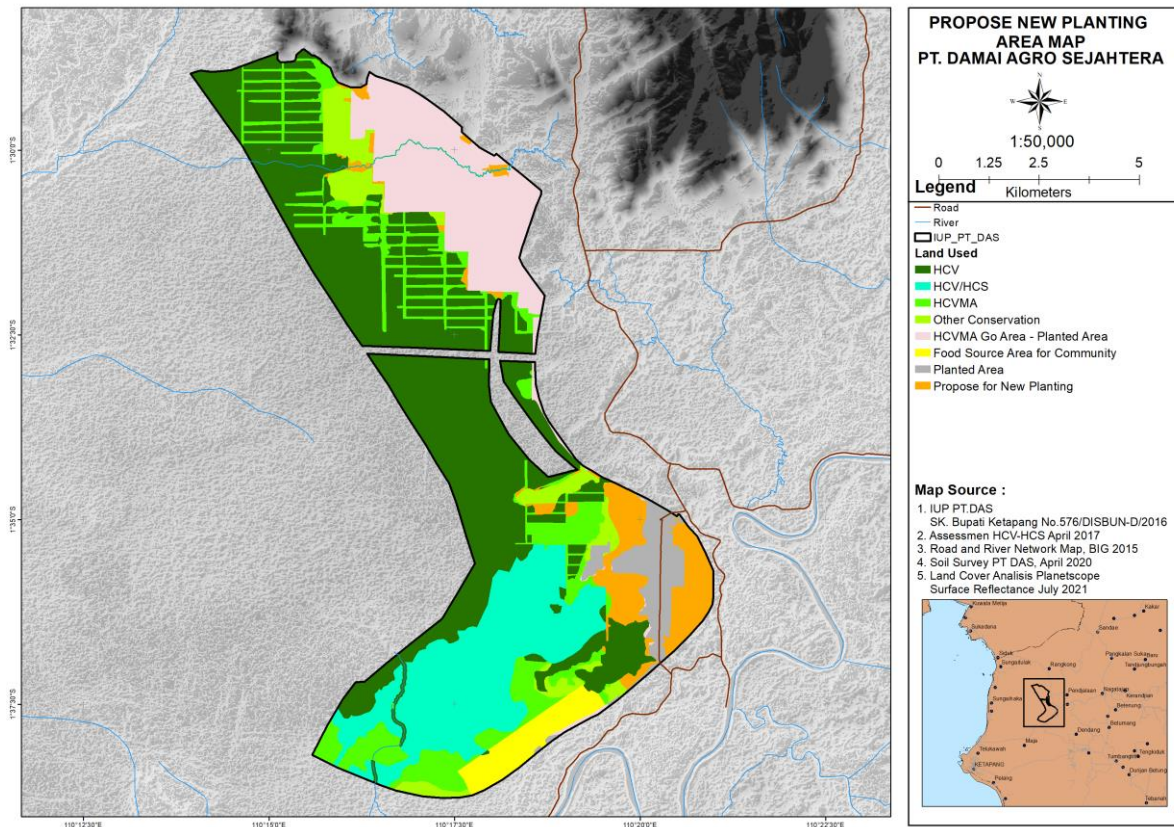
*There is a difference between what is written on the IUP & On the shp file provided by the relevant agencies. This may be due to the digitization process

Table 4: Total Area Purpose for New Planting and it's Land cover

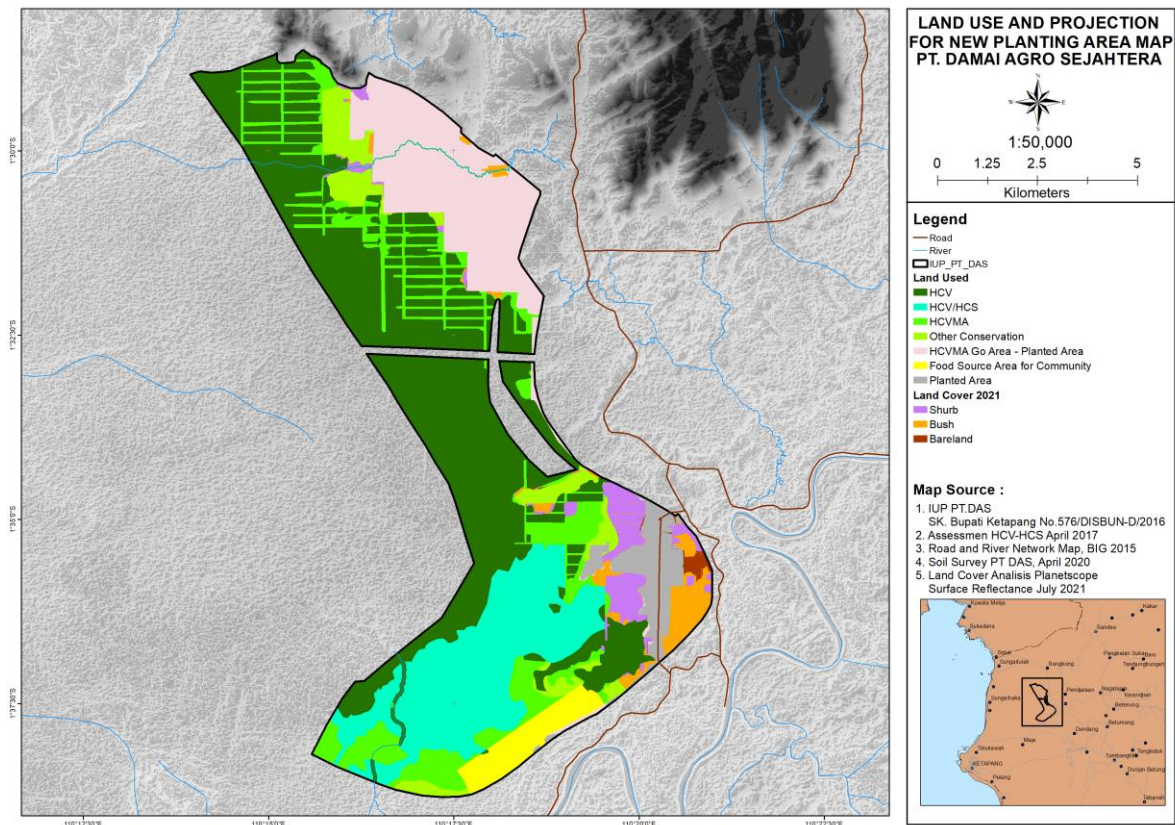
Plan for development	ICLUP Indicative	Land Cover	Area (ha)
2022	HCVMA Go Area**	Shrubs	178.18
		Bush	62.84
		Bare Land	0.48
2022	Non-Conservation Area	Shrubs	140.92
		Bush	190.83
		Bare Land	33.20
Total Proposed for Development			606.44

*J) HCVMA Go Area has been deliniated and confirmation no Peat and Orang Utan Distrubution Area

Map 8: The Area Purpose for New Planting



Map 9: Land Use & Planting Projection of PT DAS



2. Assessment Process and Procedures

2.1 Assessor and Their Credentials

2.1.1 Social Environment Impact Assessment (SEIA/ AMDAL)

The SEIA/ AMDAL document of PT DAS was prepared by consultant from PT Alam Indo Lestari which located in Jln. Dr. Wahidin S, Komp. Batara Indah I Block O No. 13-14, Pontianak, West Kalimantan Province. Webpage: www.alamindolestari.com. It has been approved by Head of Ketapang Regent according to the letter number 525/KLH-B/2016, dated 3 August 2016.

Table 5: Person and Expertise SEIA Team Assessor at PT DAS

No.	Name	Position
1	Naveri, S.Hut	Biological Expert
2	Kiki Prio Utomo, ST., M.Sc.	Chemical Physics Expert
3	Ir. Wawan Hermawan	Forestry Expert
4	Endang Mulyadi A.K., S.Hut., M.Si	Socio-cultural Expert
5	Sutriswanto, SKM., M.Kes	Public Expert
6	Eta Fanani AR, S.Hut	Team Member
7	Sulistiani, ST	Team Member
8	Agus Sudarsono, A.Md.Kom	Team Member

2.1.2 Social Impact Assessment (SIA)

The Social Impact Assessment of PT DAS was carried by Aksenta. The field study was carried on 23 March – 01 April 2017, with the composition of team is as follows:

Table 6: Person and Expertise SIA Team Assessor in PT DAS

No.	Expert Name	Expertise/Position
1	Ali Akbar Hutzi ali.akbar.hutzi@gmail.com	Team coordinator, socio-economic, social community and community development
2	Gelar Satya Budhi budhi@aksenta.com	Social relation and community culture
3	Mimin Aminah mimin@aksenta.com	Socio-economic, communication and community business development

In accordance with the RSPO requirement that SIA studies must be periodically reviewed and updated in line with existing social conditions, PT DAS has updated the SIA studies on June to July 2020, with the composition of team as follows:

Table 7: Person involved on the SIA update in PT DAS

No	Name	Agency	Posotion	Expertise
1	Gabriel Heru Prasetyo	Bumitama Agri Ltd	CSR Specialist	Coordinator for planning, iimplementation and evaluation of CSR Program and activities. Social handling issues in operational of Bumitama Plantation, especially West Kalimantan Region.
2	Kalista Khairunnisa	Bumitama Agri Ltd	CSR Officer	Assistant for planning, implementing, and evaluating of CSR programs. Social handling in the operational of Bumitama Plantation.
3	Taufik Fardiman	PT DAS	Sustainability Assisstant	Sustainability program implementer, external relations related to Sustainability Program on PT DAS
4	Terminal Sinulingga	PT DAS	Partnership Asisstant	Tenurial Study, FPIC
5	T. Ade Fachlevi	Independent Consultant	External expert	<i>Community engagement, Social Impact Assessment, HCV Social, dan FPIC</i>
6	Bias Berlio Pradyatma	Independent Consultant	External expert	FPIC & RSPO Standard
7	Reza Abdilah	Independent Consultant	External expert	<i>Land use, participatory mapping dan pemetaan tenurial.</i>

2.1.3 High Conservation Value Identification (HCV)

The HCV assessment conducted on 10 March to 20 May 2017 in the Permitted Area (Izin Lokasi) of PT DAS 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 has been reviewed by the HCVRN and was declared satisfactory in October 2019, please refer to the following link:

<https://hcvnetwork.org/reports/high-conservation-value-pt-damai-agro-sejahtera-kabupaten-ketapang-provinsi-kalimantan-barat-indonesia/>

This HCV identification was conducted together with High Carbon Stock (HCS) Assessment & Land Use Change Analysis (LUCA).

Key consultants from Aksenta have been accredited and approved by HCVRN Assessor Licensing Scheme (ALS). The team members are on Table 6.

Table 8: Key consultants HCV Assessment

Name	ALS Licence	Role	Expertise
Nandang Mulyana nandang@aksenta.com	Provisional ALS15037NM	Team Leader; Socio-Cultural assessment	Regional planning and rural development, community empowerment, participatory mapping, HCV assessment since 2009
Pupung F.Nurwata pupung@aksenta.com	N/A	Team Member, Biodiversity and landscape	Ecologist, ornithologist, facilitator of community biodiversity assessment, HCV assessment since 2007
Yanto Ardiyanto yanto@aksenta.com	N/A	Team Member, environmental services	Hydrologist, water management, GIS, remote sensing and spatial analysis, HCV assessment since 2010
Teuku Ade Fachlevi adhe@aksenta.com	N/A	Team Member, Socio-economic	Sociologist, participatory mapping, social liability, social analysis on natural resource, HCV assessment since 2013
Anwar Muzakir anwar@aksenta.com	N/A	Team Member, flora	Plant ecologist, plant taxonomist, ethno botanist and plant ecosystem assessment
Reza Abdillah reza@aksenta.com	N/A	Team Member, Mapping and GIS specialist	Forestry, GIS, remote sensing. HCV assessment, land use change analysis, carbon stock assesment
Bias Berlio Pradyatma bias@aksenta.com	N/A	Team Member, flora, and land cover analysis	Forestry, plant taxonomist, land use change analysis and carbon stock assessment
Ryan Karida Pratama ryan@aksenta.com	N/A	Team Member, Land cover change analysis	GIS and remote sensing, land cover change analysis, carbon stock assesment

2.1.4 Carbon Stock and High Carbon Stock Assessments

The carbon stock and High Carbon Stock Assessments at PT DAS were carried out concurrently with the HCV Assessment, March to May 2017.

This document has been reviewed by the HCS Approach review on March 2019 and published on the HCS website with the following link:

<http://highcarbonstock.org/wp-content/uploads/2019/04/HCSA-Report-PT.-DAS-030419.pdf>

This study was carried out by a team consisting of nine members:

Table 9: Key Consultant of HCS Assessment

Name	Role & Expertise
Bias Berlio Pradyatma (Registered Practitioners)	Carbon Stock Assessment, HCS Patch Analysis (Team Leader)
M. Fakhrul	Carbon Stock Assessment
Teungku Haikal	Carbon Stock Assessment
M. Ahda Agung Arifian	Carbon Stock Assessment, Flora specialist
Ryan Karida Pratama	Remote Sensing and GIS analysis
Heidei Putra Utama	Remote Sensing and GIS analysis
Teuku Ade Fachlevi	FPIC and Participatory mapping
Gelar Satya Budhi	FPIC and Participatory mapping
Mimin Aminah	FPIC and Participatory mapping

2.2 Assessment Methods

2.2.1 Social Environment Impact Assessment (SEIA/ AMDAL)

The data collection process was strongly associated with the type of data to be collected. In general, studies will be conducted based on primary data and secondary data. Primary data are obtained through observation, measurement and field interviews, and secondary data are 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 components that can be studied. The used data must be accurate and reliable so that it could be used to analyzed, measure and observe the environmental components which it predicted would be affected and components of action plan that would give significant impacts to the surroundings. The data were collected was as follow:

- Physical – Chemical Components (Climate, Air Quality and Hydrology, and Soil).
- Biological Components (Vegetation, Animals, and Water Biota).
- Socio-Economic Cultural Components (Demography/ Population, Social, Economic, Social and Cultural).
- Environmental Health and Public Health Components (Environmental sanitation, public health level, level of public health services).

Methods of Significant Impact Estimation

Determination of the significant impact to the environment caused by the development activities of the plantation is only intended as an attempt to estimate the large and important environmental quality changes that can be caused by the plantation development activities of PT HPE in Sub-district of Sungai Melayu Rayak and Matan Hilir Selatan, District of Ketapang, West Kalimantan Province. The method of significant impact estimation used is by differentiating the magnitude of impact and significance of impacts.

Estimation on the Magnitude of Impact

The magnitude of Impact is measured from the changes in the environmental quality. Formal and informal methods are used to estimate changes in environmental quality.

1. Formal Methods

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

2. Informal Methods

Informal method is a method that based on the professional judgment of experts, logical frame analysis and analogy. This method is used to estimate the environmental parameters which characteristics system finds difficult to identify or estimated by modeling approach such as socio-cultural systems.

Determination of Important Impact Characteristics

Assessment of the important impact characteristics were in accordance with the BAPEDAL decision Number: KEP-056 of 1994 on Guidelines Regarding Significant Impacts size. Meanwhile, in relation to the impact evaluation conducted by Important Impact scaling into two categories: important and less important. Characteristics Impact divided into two groups, negatives impact and positives impact. It will be regarded as negative if the changes/ impact estimated is get adverse towards the environmental, and it is positive if the changes/ impact estimated giving beneficial to the environment.

Methods of Important Impact Evaluation

The Important Impact evaluation explore "holistic causative" against expected environmental components that is affected. For this purpose the supporting tools used is interactions matrix. Interactions matrix between activity components and environmental component contain magnitude of Impact and Importance of Impact. This Important Impact evaluation will be conducted careful and with thorough study to the primary impact (positive / negative) and secondary impacts (positive / negative), and also other derivative impacts on the environment component and activities component.

The study on the important source impact and hypothetical impact can identify the key issues that need to be managed. Results of the Important impact evaluation are also expected to assist the decision's making process in the selection of a viable alternative plan that takes into consideration of the environmental aspects of the proposed area.

2.2.2 Social Impact Assessment (SIA)

Basically, the development of plantation area would affect the pentagon assets (human

capital, natural capital, financial capital, social capital and physical capital) in the surrounding area. The approach of this study of Social Impact Assessment was by learning the present existing condition in PT DAS, particularly the condition which was related to socio-economic condition, socio-economic impacts of the company toward the surrounding the community, and the community's perception. Based on the existing condition, compilation and preparation was conducted for documenting the SIA and social management plan which contain activities that should be conducted to create ideal condition (the desirable condition). Sampling technique being used were purposive sampling (samples were selected on the basis of researcher's judgement; who decided which of those samples were the most suitable to be selected for the purpose and objectives of the research) and simple random sampling (technique of sample collection which gave the same chance for all population elements to be taken). This sampling technique was carried with a participatory, multiparty, rapid ex-ante, appreciative and social-learning cycle approach.

The scope are restricted to the important impact, that considers the number of people affected, the distribution area of impact, duration of the impact, the intensity of the impact, and the number of Pentagon Assets component affected in the villages around the operation of PT DAS.

The secondary data or primary data collected were analyzed by integrating quantitative and qualitative method. Qualitative analysis emphasized more on the description and illustration of various facts and relation between variables being found in the field.

The findings obtained from the methods above were analyzed. The baseline of the analysis was based on RSPO criteria which is relevant to sustainable social aspects. The recommendations also covered other issues which were not in the RSPO criteria, in the form of company's policy, ideas or aspirations as the result of the field analysis.

2.2.3 HCV Assessment

Overall assessment was implemented based on the HCV Assessment Manual (HCVRN, 2017) with guidance from other documents developed by the HCV Resource Network i.e. Common Guidance for the Identification of High Conservation Value (Brown et al., 2017) and Common Guidance for the management and monitoring of High Conservation Values (2014).

1. Timeline

The HCV assessment was conducted from March to May 2017. This assessment encompasses all activity phases including stakeholder consultation, data analysis, and reporting (**Table 10**).

Table 10: HCV assessment timeline

Date	Activity
10 – 20 March 2017	Compilation of secondary information (desktop study)
20 – 22 March 2017	Compilation information and initial visit to the assessment area (scoping study)

Date	Activity
23 – 30 March 2017	Full assessment: Biodiversity, ecosystem and environment survey, socio-culture survey, local stakeholder consultations.
31 March – 2 April 2017	Data Analysis
3 April 2017	Final Stakeholder consultation
10 – 30 May 2017	Reporting

2. Data Collection

Secondary Data Collection

Secondary data is obtained through desktop study based on several data sources such as satellite images, books, journals, reports, statistical data, and websites (Table 10). Secondary data is used for initial analysis aiming to obtain an overview of the conditions of biodiversity, ecosystem, environment, social, and cultural in the assessment area.

Table 11: Data and secondary information sources

No	Data and Information Sources
Basic Data and Information	
1	Map of Satellite imagery (Citra Landsat 8, USGS, 6 March, 2017 and USGS, 22 March 2017)
2	Map of Satellite imagery (Citra Landsat 5, USGS, 3 April 2004)
3	Location map of PT DAS concession (IUP Map PT DAS)
4	Map of watershed borders (<i>Peta Batas Daerah Aliran Sungai</i> , BPDAS West Kalimantan)
5	Map of Regional Planning (<i>Peta RTRW</i> West Kalimantan year 2014-2034)
6	Landsystem Map 1:250.000 (RePPPProt, 1990)
7	Pawan River Watershed Map (Appendix of Presidential Decree No. 12 year 2012)
Further Data and Information	
8	DEM Shuttle Radar Topography Mission, 30 meter (USGS, 2004)
9	Map of Ecosystem of Kalimantan (WWF, 2006)
10	Map of Protected Areas (<i>Peta Kawasan Lindung</i> , Ministry of Environment and Forestry)
11	Map of Moratorium (<i>Peta Indikatif Penundaan Pemberian Izin Baru</i> , revised 11, Ministry of Environment and Forestry, 2016)
12	Map of Soil Type (RePPPProt, 1986)
13	Map of altitude (processing result based on SRTM data)
14	Map of slope class (processing result based on DEM SRTM data)
15	Intact Forest Landscape Map (downloaded at: http://www.intactforest.org)
16	Land Cover Map, Landsat Imagery Analysis March 6, 2017
17	Map of orangutan distribution in Kalimantan (Singleton 2004; Banes et.al., 2016)
18	Report of HCV assessment of PT DAS (Bioref, 2016 unpublished)
19	Report of HCV Assessment of PT GMS, the closed area to PT DAS concession (Aksenta, 2015)
20	Tropical Rainfall Measuring Mission Data (TRMM 3B42 product)

No	Data and Information Sources
21	Report of <i>Social Impact Assessment</i> PT Ladang Sawit Mas (Sonokeling, 2013)
22	Document of ANDAL PT DAS (2016)
23	Statistic of Ketapang District in Figure (BPS Ketapang District, 2016)
24	Statistic of Matan Hilir Utara Sub-District in Figure (BPS Ketapang District, 2016)
25	Ethnologue and Language of the Word (http://www.ethnologue.com/map/ID_k__)
26	Ethnic Distribution maps in Kalimantan, retrieved at http://www.ethnolog.com.
27	Ramsar Sites in Indonesia (http://www.ramsar.org)
28	Endemic Bird Area Factsheet: Kalimantan (BirdLife International, 2015)
29	Important Bird Areas: Key Sites for Conservation (Birdlife International, 2015)
30	Appendices I, II and III CITES, valid from 2 January 2017 (CITES, 2017)
31	IUCN Red List of Threatened Species. www.iucnredlist.org

Primary Data Collection

Primary data obtained from field activities (scoping studies and full assessments), collection of primary data using the rapid assessment techniques approach and using a combination of several data collection methods in each type of HCV such as ground truthing, field observations, field visits and consultation with the community local and stakeholders.

A combined purposive sampling and snowball sampling approach were applied to determine the sample number and location on primary data collection. The data collection generates qualitative data with geographic references (spatial data).

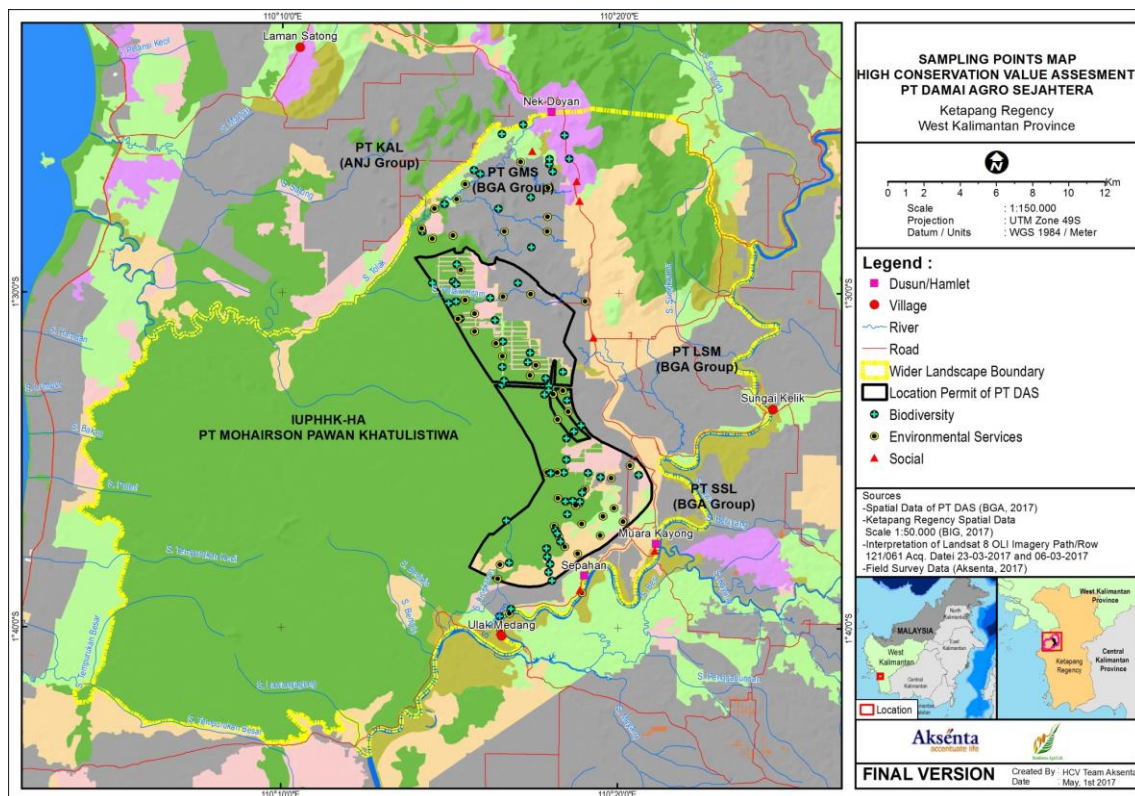
Sampling points for the identification of HCV 1-6 were determined using purposive sampling method based on land cover condition. The number of sampling in this assessment are 120 points, consisting of 51 points in the secondary forest area, 3 points in the old shrub area, and 18 points in the young shrub area, 9 points in the bush area, 11 in the oil palm plantation area, 2 in the rubber plantation area, 6 in open land areas, 5 points in residential areas, and 15 points in water bodies (sampling point see Map 2). The sampling points for the flora and fauna survey were 62 points, while the sampling points for ecosystem service surveys were 50 points, and the sampling points for social surveys were 8 points (including residential/sub-village areas). The snowball sampling method referred to the additional information from the informant/respondent which matches the assessment criteria.

Especially for social HCV assessments (HCV 5-6), settlements are chosen based on predetermined criteria, namely: (i) villages/sub-villages that have administrative areas in the assessment area, and (ii) affected villages/sub-villages from the company's operations. The number of informants/ respondents interviewed in this assessment were 91 people from 3 villages in 4 sub-villages. Three social data collection methods were applied during the assessment, i.e. semi-structured interviews, focus group discussions, and participatory mapping (Table 3).

Table 12: Community surveyed by HCV Social team and data collection methods

Sub-district	Village	Sub-Village	Semi structure Interview	Focus Group Discussion	Participatory Mapping
Nanga Tayap	Sungai Kelik	Muara Kayong	✓	✓	✓
		Sepahan	✓	✓	✓
Matan Hilir Utara	Laman Satong	Nek Doyan	✓	✓	✓
Muara Pawan*	Ulak Medang	Ulak Medang	✓	✗	✓

*Outside PT DAS permit location area, boundary conflict is occurred with Sepahan sub-village and Muara Kayong sub-village; Notes: ✓ = applied; ✗ = not applied



Map 10: Survey location of biodiversity, ecosystem services, and social data collection in PT DAS and surrounding areas

3. Field assessment

Data and information collection in the field focused on areas summed up as potential HCV area based on pre-assessment result. Emphasis was put on the field data collection where several approaches were combined:

- Participatory mapping with local community is the initial activity in the field, involving community (in Muara Kayong, Sepahan, Nek Doyan and Ulak Medang Villages) having good understanding and experience over the Assessment Area concerning the presence of the following: (a) forests and other natural ecosystems and wildlife; (b) water catchment, water bodies, and streams; (c) areas or locations containing natural

resources traditionally used by local community to meet basic needs and serve as part of their cultural identity and traditions.

- Field verification (groundtruthing) and field data collection. This activity took form of direct verification in the field of satellite image interpretation resulted from pre-assessment phase. Each assessment field checks over areas presumed to have HCV attributes or elements (potential HCV area). Field data collection for HCV 5-6 involved purposive interview and direct observation at select locations. Information gathered from the interview process includes: to what extent the concession is important to the surrounding community; reasons why the concession is important/not important; history of natural resources use by community; and the relationship that community has with concession area.
- Stakeholder consultation was involved in each phase, especially during field assessment. Physical meetings and dialogues were held with key stakeholder representatives (community of Muara Kayong, Sepahan, Nek Doyan and Ulak Medang Villages), local government including BKSDA, and relevant NGOs in Ketapang (IAR Foundation, FFI, Palung Foundation, and ASRI). Stakeholder consultation's main objectives are: (i) communicate the HCV assessment field process and preliminary findings; (ii) collect additional data and information and clarify the field findings; and (iii) gather attention, concerns, and input for reporting and making recommendation for HCV management planning. Stakeholder consultation produced important additional data and information related to the presence of HCV attributes or elements and their updated condition, clarification for or revision of the HCV assessment findings, and recommendation for HCV protection and management.

4. Data Analysis

Data obtained from field data collection were compiled and tabulated by observation location. In the earlier phases, compilation and tabulation were made separately for each field of assessment (biodiversity, environmental services, and socio-cultural HCVs). For each location, a list was developed of the confirmed HCV attributes or elements found in the field. This was followed by analysis to strengthen the justification for concluding whether or not an HCV attribute or element is found in the Assessment Area and to determine HCV area boundaries.

Indicative HCV areas were mapped for each field of assessment, producing three maps, namely (i) indicative HCV 1-3 area map; (ii) indicative HCV 4 area map; and (iii) indicative HCV 5-6 area map. Further, the three maps were combined into one single map of indicative HCV area. To produce an HCV definitive area map, delineation is necessary of the indicative HCV area, the result of which will be mapped to revise the boundaries of HCV management area.

2.2.4 Land Use Change Analysis

PT DAS also conducted Land Use Change Analysis (LUCA) to ensure that there is no deforestation due to land development. LUCA of PT DAS was conducted concurrently with HCV Assessment.

Using the satellite image of Citra Satelit Landsat TM 5, ETM+ 7, 8 OLI, Path/Row: 121/61, resolution (30m), also using the Mosaic Image Planet Resolution 4.77m/pixel sourced from PlanetScope for the latest (update) condition on August 2021, the assessment was conducted on some cut-off period refers to the procedure Remediation and Compensation RSPO:

Table 13: Time Series of Satellite Imagery used for LUCA

Period	Date of acquisition	Cloud cover (%)
Before November 1, 2005 (baseline)	August 17, 2004	0%
November 1, 2005	November 16, 2005	7%
December 1, 2007	September 19, 2007 May 16, 2008	26% 22%
January 1, 2010	September 24, 2009 May 14 2010	22% 11%
May 9, 2014	May 17, 2014	17%
Identification of HCV Area	March 6, 2017 March 22, 2017	47% 17%
After the management unit acquired by Bumitama Agri.Ltd (becoming RSPO member)	December 16, 2016 January 1, 2017	10% 37%
Latest satellite image used for ground truthing	March 6, 2017 March 22, 2017	47% 17%
Conditions at the time of filing NPP	March 7, 2020	20%
Latest condition when field verification for NPP	July 2021	10%

The land cover classification process uses Sentinel-2 satellite imagery with an acquisition date of 07 March 2020, this satellite image has 20% cloud cover and 7 July 2021, this satellite image has 10% cloud cover within the MU boundary and <10 within the AOI. A series of pre-processing of satellite imagery is carried out before the land cover classification begins (spectral enhancement: layer stacking and radiometric enhancement: histogram equalization), this process aims to sharpen the hue of each object and produce the desired brightness in the satellite image. The composite bands used in the layer stacking process are bands 4 (red), bands 3 (green), and 2 (blue) resulting in a true color composite with a resolution of 10m on the Sentinel-2 image. The pre-processing of the satellite imagery is carried out using the ERDAS IMAGINE 2014 software. After the pre-processing of the image is complete, the next step is land cover classification.

Land cover classification was carried out by combining object-based image analysis (OBIA) and visual interpretation methods with manual digitization on Sentinel-2 images. The manual segmentation process and spatial operations were carried out using ArcGIS 10.4 software while the segmentation process with the OBIA approach was carried out using the eCognition Developer 64 software. Manual digitization was performed on polygons that were not successfully segmented in the OBIA process, some of which were manually digitized referring to interpretation key generated based on field findings. Manual land cover segmentation is carried out by considering several key interpretations, namely color, texture, shape, pattern, object size, and associations. The naming of the resulting land cover class refers to SNI 7645-1:2014 concerning Classification of land cover-Part 1: Small and medium scale.

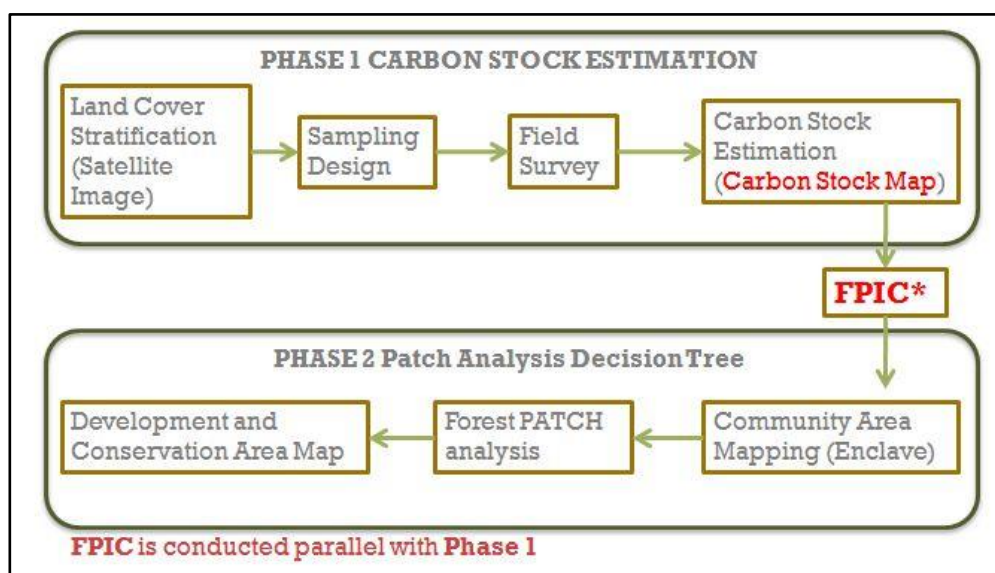
The land cover classification was then corrected using field verification data resulting in corrected land cover, then the accuracy test was carried out again with an overall accuracy value of 92.50% with Kappa 88.99%.

Table 14: Kappa Accuracy Calculation Results

Land Cover		Ground truthing Result						User Accuracy (UA)	UA (%)
		Secondary Forest	Shrub	Bush	Bareland	Oil Palm	Total		
Imagery Interpretation Result	Secondary Forest	40					40	1.0	100.0
	Shrub		4	1			5	0.8	80.0
	Bush		2	9			11	0.8	81.8
	Bareland				8	2	10	0.8	80.0
	Oil Palm				1	13	14	0.9	92.8
	Total		40	6	10	9	15	80	
Producer Accuracy (PA)		1.0	0.6	0.9	0.8	0.8	Overall Accuracy (%)=		92.50
PA (%)		100.0	66.6	90.0	88.8	86.6	Kappa Accuracy (%)=		88.99

2.2.5 High Carbon Stock

The study was carried out through two phases of work. The first phase covers satellite image analysis and field surveys to produce maps showing potential HCS areas and estimation of carbon stocks in these areas. The second phase focuses on separating areas that are not classified as HCS, patch analysis on the HCS indicative area, and establishing HCS areas to be conserved and non HCS areas that can be developed by the company.



Flowchart 1: Stages and phases of the HCS study process in The HCS Approach Toolkit

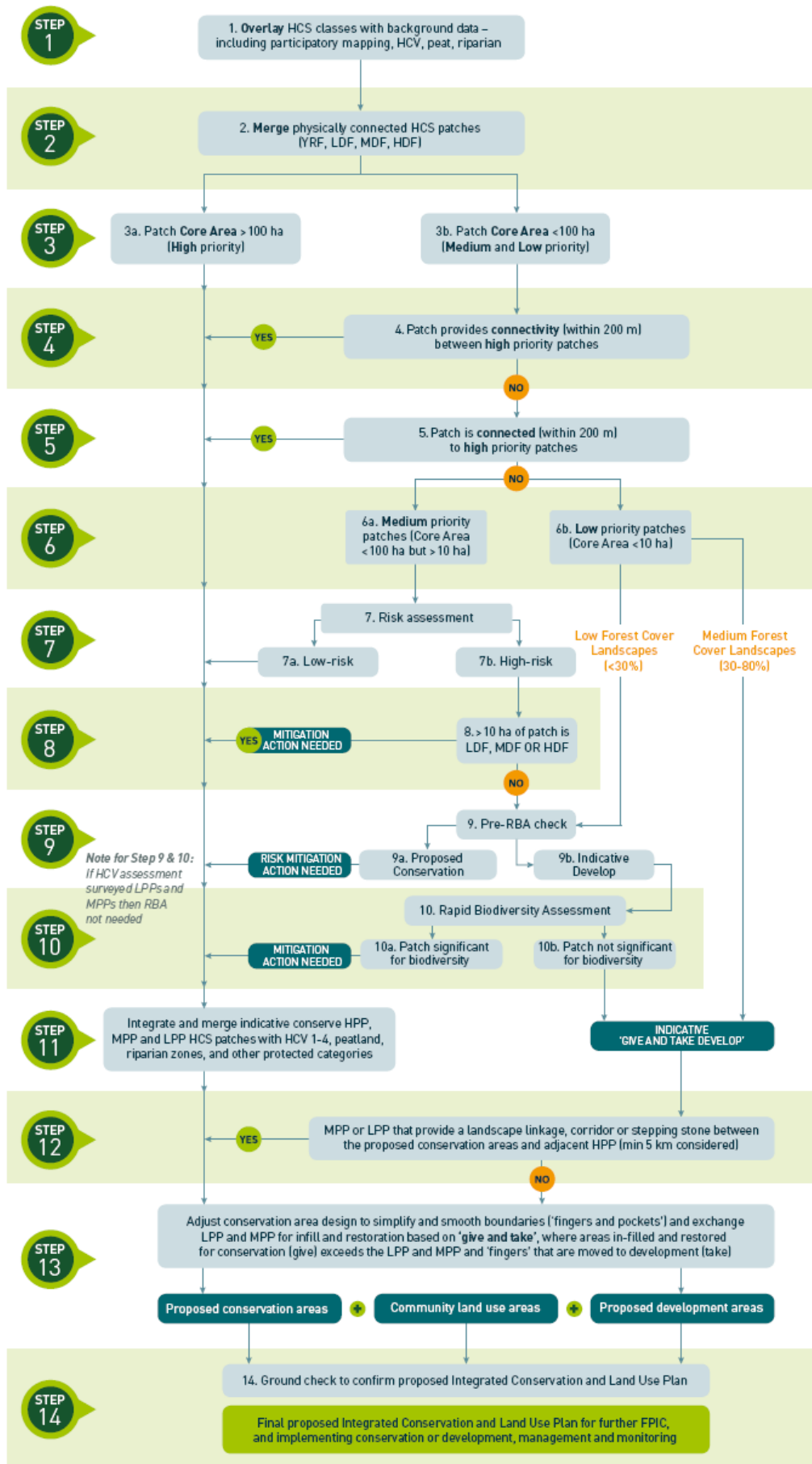
The first phase is the classification stage of land cover types and identifies areas of forest that have the potential to be HCS. The stage of classification of land cover types and determination of the location of samples is carried out through analysis of satellite imagery. This information then becomes a guideline in field data collection to estimate the value of carbon stocks in each class of land cover type.

The second phase is carried out in 3 stages. The first stage to separate areas not included in HCS includes the High Conservation Value (HCV) area, peat ecosystems, river boundaries, and areas that are a source of community income. This process is carried out by participatory mapping. The next stage in this phase is patch analysis of potential HCS areas. This stage will produce areas designated as HCS and non HCS (Potential for Development) areas. Patch analysis is done by following the path of Patch Analysis Decision Tree.

The final stage of this phase is the integration of the HCS area with other conservation areas, and mapping potential areas for oil palm plantation development, taking into account the formation of forest corridors and the compactness of conservation areas.

Data used:

Landsat Satellite Imagery 8 Path 121/Row 61, acquisition date: 27 September 2016. Classification of land cover was carried out by unsupervised classification technique and continued with visual correction of both satellite images.



Flowchart 2: HCS Patch Analysis Decision Tree

3. Summary of Assessment Findings

3.1 Social Environment Impact Assessment

The SEIA study the development of oil palm plantation of PT DAS in Sub-district of Nanga Tayap and Matan Hilir Utara, District of Ketapang, and raises 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 development of plantations of PT DAS, one aspect of which is the main consideration is the preservation of the environment, to ensure the development of the plantation is a sustainable development.

Plantation activities had been predicted to impact the environment, so it needs to be explored in depth including the four phases of activities: Pre-Construction Phase, Construction Phase, Operational Phase and Post-Operational Phase. Which each has potential environmental impacts are as follow:

- a. Decreasing water quality and aquatic biota
- b. Soil destruction and increasing rate of erosion and sedimentation
- c. Disruption of air quality & noise level
- d. Decreasing number of flora and fauna biodiversity
- e. Pests & plant diseases
- f. Change of culture, social conflict and community dissatisfaction
- g. Job and business opportunities which impact the increment of community income
- h. Land fires potential
- i. Community health problem
- j. Road traffic disruption

Magnitude and importance of the 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 include 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 revenue and public health level.

Environmental management of the environmental components that are experiencing fundamental changes, both positive and negative will be using three approaches, and they are: technological, socio-economic-cultural and institutional and this environment management plan is to form part of the Oil Palm Development plan of PT DAS.

The implementation of environmental monitoring will be carried out by PT DAS. Besides the periodic review by the management, the environmental monitoring reports will also be submitted annually to the technical adviser of the government agencies.

3.2 Social Impact Assessment

Administratively, the area of PT DAS is located at the Village of Laman Satong, Sub-district of Matan Hilir Utara, and Village of Sungai Kelik, Sub-district of Nanga Tayap, District of Ketapang, West Kalimantan Province.

Sub-district of Matan Hilir Utara is in 1°16'48" S - 1°49'36" S and 109°53'36" E - 110°53'36" E, dengan with area 720 km² or 2,28% from the total of district area. Meanwhile, Sub-district of Nanga Tayap is in 1°12'24" S - 1°38'00" S and 110°15'24" E - 110°52'00" E, with area 1.728,12 km², which is the seventh largest district in Ketapang.

Table 15: Villages Area and Population in the Study Area

Village/ Hamlet	Area		Population			Density (People/Km ²)
	Km ²	%	People	%	Householder	
Kec. Matan Hilir Utara	720,40	100	15.932	100		22
Desa Laman Satong	115,20	16	2.600	16		23
- Dusun Nek Doyan	54,00		1.200		365	
Kec. Nanga Tayap	1.728,12	100	29.995	100		17
Desa Sungai Kelik	160,18	9,3	3.883	13		24
- Dusun Sepahan	66,20		1.090		320	
- Dusun Muara Kayung	39,60		1.745		352	

Source: - Sub-district of Matan Hilir Utara and Nanga Tayap in numbers, 2016 (BPS Kab. Ketapang)
- Interview with Head of Hamlets by Aksenta Team

Ethnicity, Culture, Religion and Livelihood

Muara Kayung and Sepahan communities are predominantly Malay ethnic populations with the majority religion Islam. Whereas, the local people in Nek Doyan is mixture of Dayak Tolak Sekayu and Malay with the majority religion Christian.

Table 16: Ethnic and religious composition in the villages around PT DAS

Village	Hamlet	Major Ethnicity	Religion		
			Islam	Protestan	Budha
Sungai Kelik	Muara Kayong	Melayu	1.745	-	-
	Sepahan	Melayu	1.090	-	-
Laman Satong	Nek Doyan	Dayak Tolak Sekayu Melayu	360	828	12

Source: Interview with Head of Hamlets and Villages by Aksenta Team

The culture of shifting cultivation is still practiced by the people in Muara Kayung, Sepahan and Nek Doyan hamlets. The shifting cultivation is carried out by clearing forests in their respective hamlet areas. However, clearing forests for farming in other hamlet areas may be done on condition that permission is obtained from the local hamlet head.

Fishing is still a cultural practice which still be done by the community of these three hamlets. The presence of industries such as palm oil companies has participated in changing the habits of the local peoples. Hunting habits that are often carried out mainly by the people of the Nek Doyan began to diminish. Beside the reason most of places have been turned into oil palm plantation, the community was also more interested in making a living by working in oil palm plantations.

In contrast with the logging activity, some people from Sepahan and Muara Kayung still do it. Demand for certain types of wood at a price attracts people to stay involved in these activities, even though they realize that the activity is illegal.

Those make the livelihoods in the hamlets around PT DAS area quite diverse. The main livelihoods of families are employees or laborers of oil palm plantations, traders, fish collectors, swallow and

bird farmers (rice fields, palm oil and rubber). A small number of people work in logging, but the majority work as farmers and work as employees or laborers on oil palm plantations.

The Dayak tribe gives a big influence on the habits of the people in Nek Doyan. Peoples are prohibited from cutting durian trees even though the trees are planted by themselves. The ban is due to the durian tree wood is used for Demang coffins, so that if the cut down the tree it means the same as hoping for the death of Demang. The fruit can be used for consumption or traded.

Some traditional ceremonies are also often held at Nek Doyan as a form of gratitude from the harvest or other. The results of interviews with Demang of Nek Doyan, the following are the names of traditional ceremonies that are usually performed: Turun Dekekais, Pelepas Tebangan, Pelepas Api, Pelepas Tugal, Kumpul Mencauk, Memaharu, Selepet Boleh, dan Pemagu atau Gawai.

Educational

The description of the educational condition of the peoples in the two hamlets around PT DAS is not much different. Based on the result of interviews with the head of hamlets in the study areas, the majorities of the community's level of education are primary school (SD). This situation is related to the accessibility of secondary school education facilities that are quite far away and the condition of road infrastructure that is unfavorable.

Elementary schools are available in each hamlet, even in Nek Doyan there are two elementary schools. However, to continue to the secondary school level, they should travel a considerable distance, to Ulak Medang Hamlet. In Sepahan and Muara Kayung hamlets, there is each one elementary school. However, currently in the Nanga Tayap sub-district which is not far from Sepahan and Muara Kayung, the Nanga Tayap 2 Public High School has been built.

Table 17: Educational Facilities; Elementary School, Junior & Senior High School
Sub-district of Matan Hilir Utara and Nanga Tayap, 2016

Item	Sub-district		District of Ketapang	
	Matan Hilir Utara	Nanga Tayap	General	Religion
Kindergarten (unit)	3	9	147	
Number of Teacher (person)	16	16	746	
Number of Student (person)	72	230	5.899	
Ratio Teacher : Student				
Elementary School (unit)	15	45	518	17
Number of Teacher (person)		341	4.620	218
Number of Student (person)		4.359	64.660	1.833
Ratio Teacher : Student				
Jumlah Junior High School (unit)	4	11	121	18
Number of Teacher (person)	60	108	1.516	252
Number of Student (person)	829	1.228	20.024	3.143
Ratio Teacher : Student				
Jumlah Senior High School (unit)	1	2	47	8
Number of Teacher (person)	24	37	916	161
Number of Student (person)	231	337	11.543	1.715

Source: - Statistic Number of Matan Hilir Utara, 2016
- Statistic Number of Nanga Tayap 2016
- District of Ketapang in Numbers, 2015

Health, Clean Water and Sanitation and Electricity Sources

Each hamlet already has health facilities at the level of public health care (puskesmas) or puskesmas auxiliary (Pustu). Each puskesmas or pustu is equipped with a nurse or midwife. For serious treatment, patients will be referred to hospitals with great distances such as in Ketapang. For mobilization of patients who will be referred to the hospitals, they head of hamlets) usually borrow people's vehicles or by ambulances owned by palm oil companies in their area.

Water sources in the three hamlets are obtained from wells and rivers. The people of Nek Doyan generally use well water for sanitation, cooking and drinking. Nek Doyan Hamlet is not included in the flooded area so that when it rains their wells are not dirty or polluted due to flooding. Unlike the Muara Kayung and Sepahan, they location is not far from the Pawan River.

When heavy rains usually Pawan River overflows and flooding the village to reach a half meter. As a result, besides disrupting transportation routes, it also pollutes community wells so the water cannot be used. If the flood conditions are like that, well water is only used for sanitation purposes, while for cooking and drinking they should buy.

To meet the energy needs of the hamlets around the PT DAS plantation is quite good. Electricity available from PLN covers all the hamlets around the PT DAS plantation.

For daily cooking purposes, people generally use LPG which is easily obtained in stalls in the hamlet area at a price of around IDR 27,000 to 30,000 for a 5 kilogram's tube. Only a small portion uses firewood.

Transportation and Economic Facilities

All hamlets in the PT DAS area are already connected by land routes for transportation purposes. Some roads are still in the form of land and asphalt. Some land routes are built by villages through CSR funds from companies around, some are provincial and even central routes. When this study was carried out, the number of lanes belonging to the central government, it was in the process of repairing/ hardening asphalt. Public vehicles in the study area are not yet available, but often people who have a car rent their cars or use them like public vehicles with a certain rate. In addition to land routes, there are also people who use the Pawan River as a water transportation route using boats.

The economy of the local people in general is very dependent on the economy of the palm oil industry, while others are still dependent on farming, rubber, oil palm cultivation, fishing and logging. Every main street in the sub-district has developed a variety of grocery stores and several rice stalls. Goods sold in stores ranging from household needs, stationery, snacks and various other daily necessities.

Key Issues

a. Internal Issues

Table 18: Internal Social Issues related to the company activities

Operational Activity	Issues		
	Past	Present	Future
Communication, Social Relation and Partnership	community considers lack or no socialization of plantation operational	-	-
Licensing	Company licensing which overlaps with PT Mohairson.	-	-
Recruitment and employee management	-	- Availability of medicines for the sick is very limited in kind. - Limiting the maximum age of workers 45 or 50 years is considered inappropriate by the community because they feel they are still able to work productively	Recruitment for mill employees are those with a minimum of high school education, while in general the working-age population has only elementary to junior high school education
Plantation Infrastructure development	-	-	Not strict in applying worker safety standards related to the use of PPE
Land Tenurial	-	-	-
<i>Land clearing</i>	-	-	-
Planting and insertion	-	Workers filling sacks of fertilizer is complain because the company required overtime is too heavy (2 additional tons)	Complaints from workers will develop into louder protests, in line with the weakening of the body due to aging
Plant maintenance	-	Fertilizer workers complained that they had not got milk for supplementary food for three months	Complaints from workers will develop into louder protests, with greater issues
Harvesting and FFB Transportation	-	-	-

b. External Issues

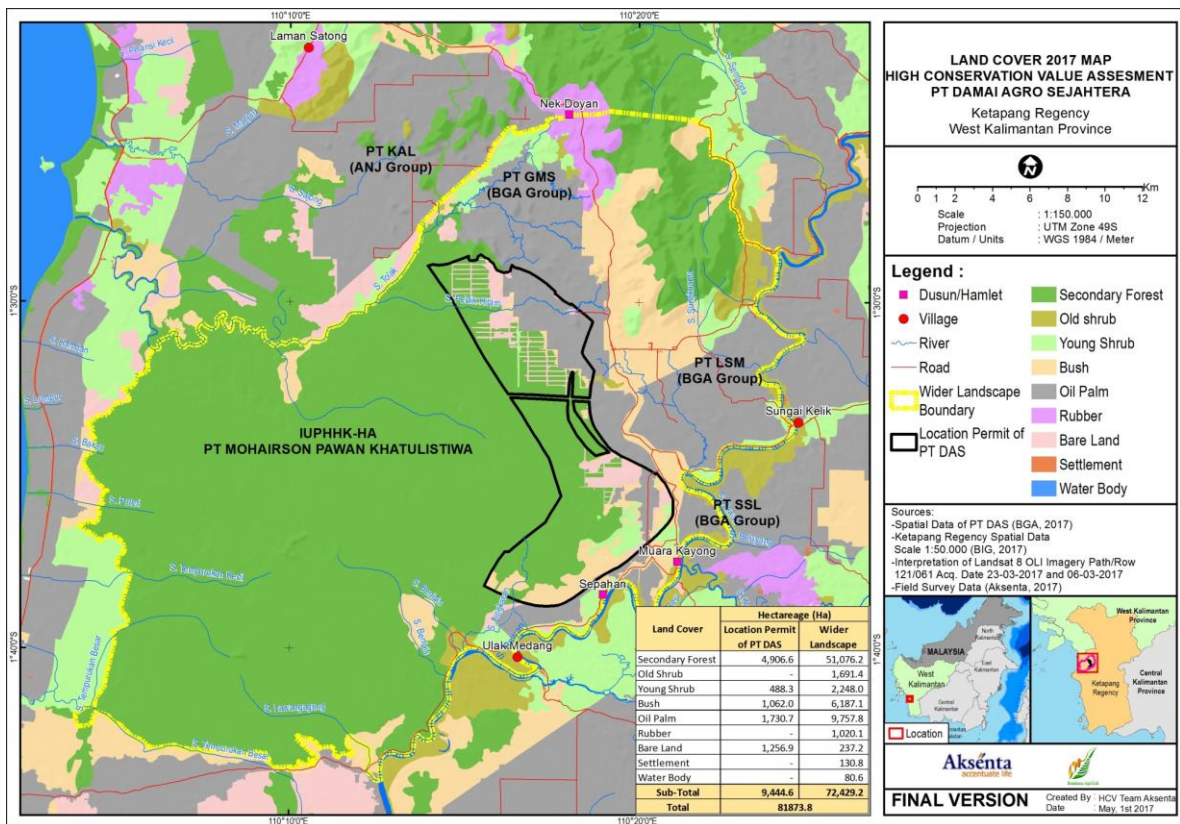
Table 19: External Social Issues related to the company activities

Operational Activity	Issues		
	Past	Present	Past
Communication, Social Relation and Partnership	The company has not yet conducted socialization so that the public does not know what will happen from company's activities.	-	-
	-	The local peoples objected to the company due to not notifying them of the change in management	The community will easily blame the new management

Operational Activity	Issues		
	Past	Present	Past
	-	Communitites require that if the development of oil palm plantations would be continued, the company must adopt promises from the previous management	-
Licensing	Company licensing which overlaps with PT Mohairson.	-	-
Recruitment and employee management	-	Peoples are not agreeing related to the age requirement of employees which are not more than 50 years.	Recruitment workers from the outside village area will be increasing, due to lack of human resources in the local area. However, it will increase jealousy from the local people, especially those with age over 45 years who feel capable of working
Land Tenurial	-	A boundary conflict occurred between Sepahan and Ulak Medang, even though GRTT has already been paid for and accepted by Sepahan Hamlet.	Ulak Medang's community demands will continue to occur.
	-	Peoples from Muara Kayung lost their land ownership rights, because the land was sold to the company by someone else. Satlak knew of these issues but did not report them to the Company.	Worse issues, if the company does not get attention on this matter.
	-	The difference in GRTT values between hamlets caused jealousy, especially from the Nek Doyan hamlet, which was paid the least per hectare.	Nek Doyan will continue to dispute this difference, because besides that they also feel that the land taken by the company is wider than the surrender
	-	he payment method for distributing GRTT between hamlet.	-
	-	Peoples of Muara Kayung feel that the distribution of GRTT is still less than it should be, because there is a communal land that is considered unpaid by the company.	-
	-	Villages do not yet have clear boundaries.	-
Plantation Infrastructure Development	-	-	-
Land Clearing	People's lands who want to be enclaved is affected by the company, and the company has not made a replacement and the price of land is too small, so the residents feel loss	The evicted rpeoples have not yet received compensation	-
Nursering	-	Gloves are not given to workers in sufficient quantities, so that some are purchased by employees themselves.	-

Operational Activity	Issues		
	Past	Present	Past
Planting and insertion	-	-	-
Plant maintenance	-	-	-
Harvesting	-	-	-
FFB Transportation	-	The community in Nek Doyan wants to be involved in the FFB transportation activities.	-

3.3 HCV assessments



Map 11: PT DAS on the Map of Land Cover, at the time of HCV Assessment (March 2017)

3.3.1 Regional and National Context

The assessment area is located in Borneo, a large island rich in biodiversity. There were 267 species of Dipterocarp, 155 of which were endemic. Borneo was the centre of the world's Dipterocarp. There are 225 species of terrestrial mammals with 44 species are endemic (Payne et al., 2000); 639 bird species, with 358 species and 37 endemic species (MacKinnon et al., 2000), 166 species of snakes (Stuebing, 1991), between 140-150 species of amphibians (Inger and Stuebing, 1997), 394 species of freshwater fish with 149 endemic species (MacKinnon et al., 1996) inhabit the island. Some unique species of island inhabitants are orangutans (*Pongo pygmaeus*), proboscis monkey (*Nasalis larvatus*), gibbons (*Hylobates albibarbis* and *H. muelleri*), clouded leopards (*Neofelis diardi*), red cats (*Pardofelis badia*), ibis karau (*Pseudibis davisoni*), and storks storm (*Ciconia stormi*).

In addition to the conservation area established by the government, several international organizations have identified key areas for biodiversity in Kalimantan. The position of the assessment area for several internationally recognized biodiversity key areas are:

- i. Important Bird and Biodiversity Areas (IBAs). The closest IBAs are Gunung Palung ID 047 (IBA 157: 'Bornean Mountains') which is \pm 18 km away to the north.
- ii. Ramsar Site. There are two Ramsar Sites in Kalimantan, namely Lake Sentarum National Park which is located \pm 300 km northeast, and Tanjung Puting National Park is located \pm 250 km southeast.
- iii. Endemic Bird Areas (EBA); EBA Kalimantan covering the mountains in the territory of three countries: Indonesia, Malaysia and Brunei. The assessment location is located outside the EBA.
- iv. The Heart of Borneo (HoB). This area includes the Intact Forest Landscape, and the largest EBA in Sundaland. HoB is located \pm 250 km northeast of the assessment area.
- v. Ecoregions; referring to the WWF Ecoregion map (2009), the assessment area is in the Lowland Forests Borneo region and Bornean Peat Swamp Forests.

The area of Ketapang District covers 3.6 million ha consist of 92% land surface and 8% of water. About 8.6% (284,506 ha) of the area is peatland. which covers 16.9% of the total peatland area in West Kalimantan Province (ranked 3rd).

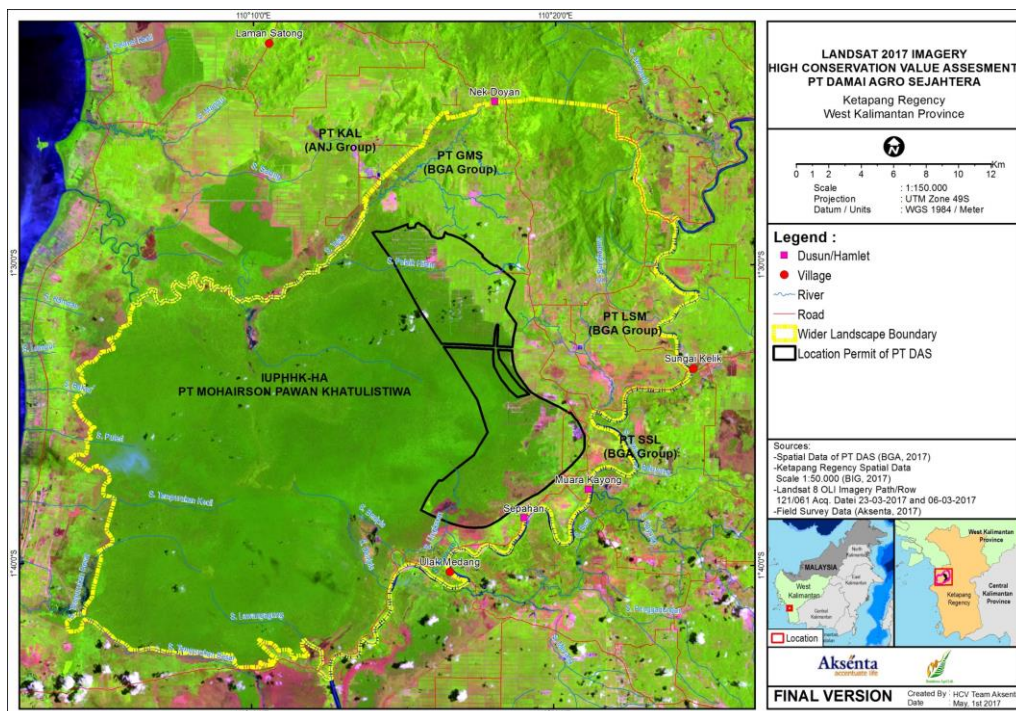
The peatland management in Ketapang District is a priority in West Kalimantan Province. In 2016, the government set a target of peat restoration in protected areas around 28,318 ha, about 4,871 ha (17%) is in the Ketapang District. The target area for restoration of licensed cultivation areas is 64,077 ha, about 5,315 ha (31%) is located in Ketapang District. The target area for restoration of unlicensed cultivation areas is 27,239 ha, about 5,315 ha (20%) is located in Ketapang District.

In national scale, the peatland restoration area covers 2.49 million ha and lies in seven provinces, i.e. Jambi, Riau, South Sumatra, West Kalimantan, Central Kalimantan, East Kalimantan, and Papua. According to Presidential Decree No. 32/1990, the national peatland protection aims to control the region hydrology which functions as water anchor and flood prevention as well as protecting unique ecosystems in the region. The target of peat restoration in West Kalimantan is only 4.8% of the National peatland restoration plan.

3.3.2 Landscape Context

Wider landscape boundaries is obtained from the scoping study. The landscape boundaries based on the scale and intensity of PT DAS operational activities toward the 6 types of HCV definition. The wider landscape in this assessment is 73,473.4 ha (Map 7 & 8) with the explanation as follows:

- PT DAS operational have the potential to create human-orangutan conflict, because the plantation is directly adjacent to orangutan habitat (peat swamp forest to the west of the MU)
- The operational of PT DAS have the potential to reduce the function of orangutan corridor to the north of the company's area
- The operational activities of the management unit are in the peat hydrological area (KHG) so that it can potentially affect the peat swamp hydrological system
- The operational activities of PT DAS have the potential to eliminate public access to the use of natural resources, especially in the field of freshwater fisheries. The results of the initial visit revealed that there were fishing communities in the rivers in the peat swamp
- PT DAS operational activities have the potential to cause peatland fires. This is based on the results of observations during scoping study, where in the southern part of the assessment area there have been several land fires
- Peat forest area between the Tolak River and Pawan River as an important water catchment area
- Some local communities have direct interaction with PT DAS areas in form of natural resource utilization and land tenure, and its potential negative impacts from the operational of the company.



Map 12: Landsat 8 OLI satellite imagery (in 2017), at the time of HCV assessment

3.3.3 Biodiversity Context

The closest protected area from the assessment area is Gunung Tarak Protection Forest (HL), which has a direct border to the north-east, then Gunung Palung National Park (TN) which is located 18 km away to the north of the assessment area. Space between the national park area and the assessment area in the form of oil palm plantations.

The assessment area is part of the KHG Pawan River - Sungai Tolak and part of the Sungai Putri essential ecosystem area (KEE). This KEE is one of the important habitats for orangutans outside the conservation area.

RTE species with its natural range comprise the assessment area i.e. Bornean orangutans (*Pongo pygmaeus*), pangolin (*Manis javanica*); proboscis monkey (*Nasalis larvatus*), kelawit gibbon (*Hylobates albibarbis*), flat-head cat (*Prionailurus planiceps*), thorn tortoise (*Heosemys spinosa*), and biuku (*Orlitia borneensis*), *Shorea balangeran*, *Shorea pachyphylla*, *Shorea platycarpa*, *Shorea teysmanniana*, *Shorea albida*, and *Shorea uliginosa*.

The interpretation of Landsat 8 satellite images on March 22, 2017 and ground truthing shows that land cover in the wider landscape is dominated by secondary forest (50,822.6 ha), oil palm (10,011.4 ha), and shrubs (6,187.1 ha). The land cover in the PT DAS area is mostly secondary forest (4,906.6 ha), oil palm (1,730.7 ha) and open land (1,256.9 ha) (Map 6 & 7).

The field survey successfully detected (directly or indirectly) 29 species of mammals, 95 species of birds, 20 species of reptiles and 191 species of plants. Of the 335 fauna and flora species, there are 31 endemic species and 4 species with Critically Endangered status, 5 Endangered species, 17 Vulnerable species, 5 species listed in Appendix I-CITES, and 41 protected species (Table 20).

Table 20: Species diversity detected in assessment area and its conservation status

Group	Species Number	Endemic	IUCN			CITES App. I	Protected
			CR	EN	VU		
Mammals	29	5	2	1	6	4	12
Bird	95	2	0	0	0	0	21
Reptile	20	1	0	2	2	1	3
Plant	191	23	2	3	6	0	5
	335	31	4	6	14	5	41

Note: *Endemic to Kalimantan island; IUCN Status: CR=Critically Endangered, EN=Endangered, VU=Vulnerable, CITES: App. I=enlisted in Appendix I; Protected based on Law No 5 year 1990, Government Regulation no 7 year 1999 and Government Regulation No 8 year 1999; Regulation Of The Minister Of Agriculture No 54/Kpts/Um/2/1972, Minister of Forestry Decree No. 261/Kpts-IV/1990)

Eight adult orangutans were found directly in forested areas, and sixteen (16) orangutan nest tree were located. Other endemic or RTE species detected directly (visual and/or audial) are *Hylobates albibarbis*, *Pityriasis gymnocephala*, *Varanus borneensis*, *Heosemys spinosa*, *Cuora amboinensis*, and 23 species of plants (Map 8). Based on local information, there are possibly

several other important species i.e. *Nycticebus menagensis*, *Tarsius bancanus*, *Macaca nemestrina*, *Helarctos malayanus* and *Aonyx cinereus* (Table 21).

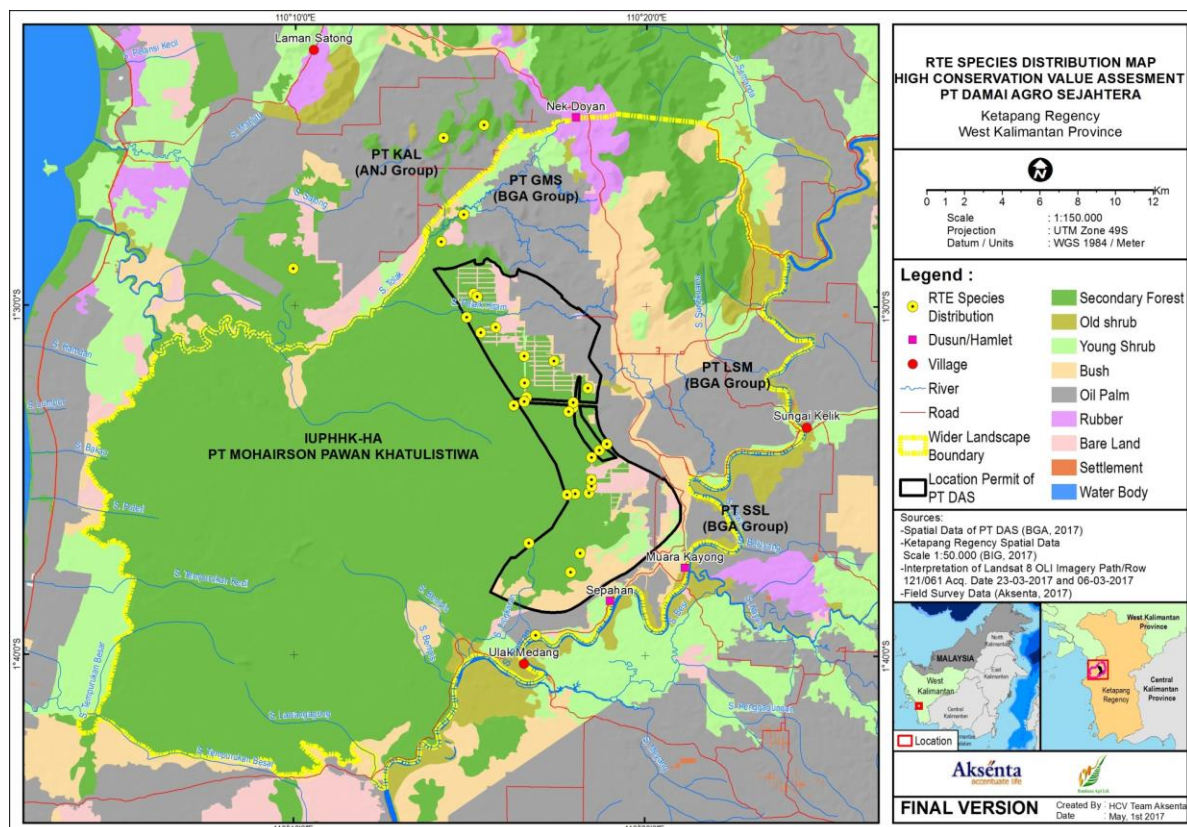
Table 21: List of Endemic, RTE Species in assessment area

No.	Latin Name	English/Local Name	Status				Type data*
			Range	IUCN	CITES	UU	
Mammals							
1	<i>Pongo pygmaeus</i>	Bornean Orangutan	E	CR	I	D	Ob, Tr
2	<i>Hylobates albibarbis</i>	Bornean White-bearded Gibbon	E	EN	I	D	Ob
3	<i>Presbytis rubicunda</i>	Maroon Leaf Monkey	E	LC	II	D	Li
4	<i>Macaca nemestrina</i>	Pig-tailed Macaque	<	VU	II	-	Ob
5	<i>Nycticebus menagensis</i>	Bornean Slow Lories	E	VU	I	D	Li
6	<i>Tarsius bancanus</i>	Horsfield's Tarsius	<	VU	II	D	Li
7	<i>Helarctos malayanus</i>	Sun Bear	<	VU	I	D	Tr
8	<i>Arctitis binturong</i>	Binturong	<	VU	-	-	Li
9	<i>Manis javanica</i>	Sunda Pangolin	<	CR	II	D	Li
10	<i>Sus barbatus</i>	Bearded Pig	E	VU	-	-	Li
Birds							
11	<i>Pityriasis gymnocephala</i>	Bornean Bristlehead	E	NT	-	-	Ob
12	<i>Lonchura fuscans</i>	Dusky Munia	E	-	-	-	Ob
Reptile							
13	<i>Tomistoma schlegelii</i>	False Garial	<	EN	I	D	Li
14	<i>Varanus borneensis</i>	Earless Monitor Lizard	E	LC	II	D	Ob
15	<i>Heosemys spinosa</i>	Spiny Turtle	<	EN	-	-	Ob
16	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	<>	VU	II	-	Ob
17	<i>Siebrenkociella crassicolis</i>	Black Terrapin	<	VU	II	-	Li
Flora							
18	<i>Combretocarpus rotundatus</i>	Prepat/ Jadam paya	<	VU	-	-	Ob
19	<i>Anisoptera marginata</i>	Mersawa paya	<	EN	-	-	Ob
20	<i>Dipterocarpus coriaceus</i>	Keruing paya	E*	CR	-	-	Ob
21	<i>Dryobalanops fusca</i>	Ampadu	E	CR	-	-	Ob
22	<i>Hopea griffithii</i>	Merawan	<	EN	-	-	Ob
23	<i>Shorea albida</i>	Alan, Lampung	E	EN	-	-	Ob
24	<i>Shorea uliginosa</i>	Meranti lang	<	VU	-	-	Ob
25	<i>Aquilaria microcarpa</i>	Tengkaras, karas	<	VU	II	-	Ob
26	<i>Gonystylus affinis</i>	Banit, Bidaru	<	NE	II	-	Ob
27	<i>Gonystylus bancanus</i>	Ramin	<	VU	II	-	Ob
28	<i>Nepenthes fusca</i>	Kantungsemar	E	VU	II	D	Ob
29	<i>Nepenthes bicalcarata</i>	Kantungsemar	E	VU	II	D	Ob
30	<i>Albizia rosulata</i>	Jaring hantu	E	LC	-	-	Ob
31	<i>Fordia splendidissima</i>	Krat rusa	E	LC	-	-	Ob
32	<i>Alseodaphne borneensis</i>	Medang	E	LC	-	-	Ob
33	<i>Aporosa granularis</i>	Janggau, Kayu masam	E	LC	-	-	Ob
34	<i>Ficus midotis</i>	Kayu arah	E	LC	-	-	Ob
35	<i>Horsfieldia laticostata</i>	Piasau piasau	E	LC	-	-	Ob
36	<i>Ardisia macrocalyx</i>	Marpingam	E	LC	-	-	Ob
37	<i>Ardisia pyrsocoma</i>	Obah	E	LC	-	-	Ob
38	<i>Syzygium caudatilimbium</i>	Jambu-jambu, Obah	E	LC	-	-	Ob
39	<i>Mussaenda lanuginosa</i>	Siwurungan	E	LC	-	-	Ob
40	<i>Neonauclea gigantea</i>	Tintap.	E	LC	-	-	Ob
41	<i>Aristolochia naviculilimba</i>	Canar bunga	E	LC	-	-	Ob
42	<i>Ellipanthus beccarii</i>	Kadarai	E	LC	-	-	Ob
43	<i>Daemonorops mirabilis</i>	Rotan	E	LC	-	-	Ob
44	<i>Dyera lowii</i>	Jelutung paya	E*	LC	-	-	Ob

No.	Latin Name	English/Local Name	Status				Type data*
			Range	IUCN	CITES	UU	
45	<i>Dipterocarpus confertus</i>	Meranti batu	E*	LC	-	-	Ob
47	<i>Archidendron borneense</i>	Jiring paya	E*	LC	-	-	Ob
48	<i>Knema latifolia</i>	Darah-darah	E*	LC	-	-	Ob

Source: Field survey Aksenta, March-April 2017

Notes: * Data type: Ob = Observed; Tr = trace; Li = local information, Range: distribution range; E=Endemic Borneo; <= found in Sumatera and Malaysia Peninsular; <= has distribution in eastward of Borneo, e.g. Sulawesi, Philipina, Lesser Sunda. IUCN Status: CR=Critically Endangered; EN=Endangered; VU=Vulnerable, CITES=Appendix I and II; - = not listed. UU-D=protected under Indonesian law (Law No. 5 tahun 1990, Government Regulation No. 7 year 1999, and Government Regulation No. 8 year 1999, Minister of Agriculture Regulation No 54/Kpts/Um/2/1972, Minister of Forestry Decree No. 261/Kpts-IV/1990); - = not protected.



Map 13: RTE species (including Orangutan nest tree) encounter location in PT DAS landscape area

3.3.4 Physical Context

The average annual rainfall (CH) in the study area is about 3200-3300 mm the number of rainy days 130-140. The CH distribution pattern includes equatorial pattern and two rain peaks: March-April and November-December. The dry period occurs in July - September. The average CH in the wet period (rainy season) increased by 22.2% from normal condition, and in the dry period (dry season) reduced by 22.1%.

In general, the land topography is classified as very flat (slopes less than 3%) with elevations range between 30-50 m above sea level. The land elevation of mineral soil is relatively higher than the peat soil. The majority area were covered by freshwater topogen peat (tropohemist, tropofibrist, troposaprist). The depth of peat varies, with the deepest reaches more than 5 m.

The remaining area has mineral soils for instance order inceptisol with parent clay material comes from the rear swamp of the Pawan River meander and order oxisol comes from incised old volcanic hills.

Based on the map of land system , there are seven land systems in the landscape assessment i.e. Gambut (GBT), Honja (HJA), Sebagau (SBG), Klaru (KLR), Telawi (TWI), Rangankau (RGK), and Mendawai (MDW). In the management unit area there are four types of land systems i.e. MDW, GBT, SBG, and HJA. The GBT land system is dominant in the north-west, MDW is dominant in the central and south, HJA is in the north along with PT GAS, and SBG is in the east corner of the assessment area. The landform system of GBT, MDW, and KLR are swamp areas. The SBG landform is the belt of Pawan River meander with very flat topography and alluvium riverine lithology. The HJA landform is a metamorphic plain with a rather hilly topography, while the RKU is a sedimentary plain with an undulating-rolling topography. The TWI landform is a ridge system area around Bukit Tarak.

Hydrologically, the assessment area is in the downstream area of the Pawan-Tolak Watershed. The upstream part of the Pawan watershed consists of Gunung Raya area (1165 m asl), Mount Rabainanggung (1508 m asl), and Batu Putih Mountain (1000 m asl). The river that flows in the northern part of the assessment area is the Pelaik Hitam River (Tolak Stream) and in the southern part flows the Lingkaran River (Pawan Stream). The Pelaik Hitam River upstream is in the western part of Mount Tarak, while the Lingkaran River flows from PT MPK's IUPHHK-HA area.

3.3.5 Socio-Cultural Context

Villages which interact and directly affected by PT DAS activities Sungai Kelik Village, Nanga Tayap Sub-District; Laman Satong Village, Matan Hilir North District; and Ulak Medang Village, Muara Pawan District. The demographic conditions of the villages area detailed in Table 22.

Table 22: The demographic condition of villages which affected directly by PT DAS activities

Village	Size (km ²)	Population	Density (person/km ²)
Sungai Kelik	160,18	3.759	23
Laman Satong	326,28	2.843	9
Ulak Medang	161,28	614	4

Source : Central Agency on Statistics (BPS), 2017

Notes : The area coverage based on BPS is not definitive, however it has been confirmed with the local people

There are three sub-villages which become the objects of social assessment, namely Muara Kayong and Sepahan Sub-villages in Sungai Kelik Village, and Nek Doyan Sub-village in Laman Satong Village. The number of households in the three sub-village are 1,037 households with population of 4,035 peoples. Muara Kayong is a sub-village with the highest number of population (Table 23). Ulak Medang Village was excluded from the object of assessment because it might trigger a conflict between the village / sub-village boundary with Sungai Kelik Village, as indicated by community leaders from both villages.

Table 23: The demographic of sub-villages in the assessment area

Village	Sub-village	Number of house hold (KK)	Population
Sungai Kelik	Muara Kayong	352	1,745
	Sepahan	320	1,090
Laman Satong	Dusun Nek Doyan	365	1,200

Source : Initial Consultation with the authorities of subvillages, 2017

Note : the area coverage is not definitive, there are conflicts on the subvillage border

The majority of local people have multiple livelihoods (more than one source). The main livelihood is to become employees of oil palm plantation companies, farmers, loggers and traders. The second livelihood is fish collectors and farm labor. Fish collectors are no longer the main source of livelihood, because fish catches cannot fulfil their daily needs. The Pawan River, swamps and ditches (including oil palm plantation trenches) are the places where people find fish. This situation illustrates that basically local communities are no longer fully dependent on natural resources, especially forests.

Infrastructures to support the socio-economic and cultural activities of the local community are available and evenly distributed in each sub-village, both the accessibility, health, education facilities as well as the availability and accessibility for fuel/energy. Ketapang and Sukadana cities are accessible and there are no sub-villages that do not have accessibility. All sub-villages have health facilities like village maternity center (*Polindes*) and receive health service visits from the sub-district every once in a month. The elementary school facilities are available throughout the sub-village, while the secondary and high schools are available in the Nek Doyan Sub-village. All sub-villages have electricity from the government (PLN), and the majority of local people currently use 3 kg LPG (subsidies).

The indigenous peoples in this region are Malay who occupies Muara Kayong and Sepahan Sub-villages, and Dayak Tolak Sekayu who inhabits Nek Doyan Sub-village. The Malay community embraced Islam, and the Dayak Tolak Sekayu people embraced Christianity. In their native villages there were migrants from Java, Flores and Sumatra who came a long time ago and had become part of the local community. They live in harmony, there have never been conflicts related to ethnicity and religion.

The traditional customs of the Malay people are guided by the teachings of Islam, while the Dayak Tolak Sekayu people still refer to ancestral traditions. The traditional activities of Malay people are seen in special moments from the human life cycle, such as the birth, marriage and death phases. The traditional program of the Dayak Tolak Sekayu community is closely related to field rice farming activities, such as *turun pekakais*, *pelepas terbang*, *pelepas api*,

pelepas tunggal, kumpul mencak, memeharu dan selepit benih. Traditional ceremonies were celebrated from land preparation, land clearing, planting, maintenance, harvesting and seeds preparation. Nyapat, is a traditional ceremony for the end of the year as a form of gratitude for the Dayak Tolak Sekayu people to their ancestors and creators.

3.3.6 HCV Outcomes and Justification

The results of the assessment indicate situations which require HCV at PT DAS Location Permit area. There are five HCV categories detected, namely HCV 1, 2, 3, 4, and 5 in the PT DAS Location Permit area. While areas that qualify as HCV 6 are only found outside the PT DAS Location Permit. A summary of the presence of HCV in the PT DAS location permit area is as follows.

Table 24: HCV Identification Summary in PT DAS landscape area

HCV	Definition	Summary of Description and Justification		
		Present	Potential	Absent
1	Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels	Population of endemic or RTE species, such as: Orangutan, gibbon, Spiny turtle	-	-
2	Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes (IFL) 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	Part of the landscape of the Pawan River - the Tolak River Hydrological Units.	-	-
3	Rare, threatened, or endangered ecosystem, habitats or refugia	Peat Swamp Forest Ecosystem, Dipterocarp Forest	-	-
4	Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes	Hydrological regulator and management of extreme water flow events	-	-
5	Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples	The river is used as an important fishing site by local communities	-	-
6	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	-	-	There is a historical and sacred site for the Tolak Sekayu Dayak Tribe of Nek Doyan Sub-village, but the site is located outside PT DAS area

HCV 1: Species Diversity (Present)

HCV 1 is the concentration of biodiversity including endemic species, and rare, threatened or endangered species (RTE) at the global, regional or national level. Based on the definition of HCV 1 (Brown et al, 2017), there are strong indication that several endemic and RTE species occurred in the PT DAS area (Table 21).

The HCV 1 area comprises whole KHG with its protection function, remaining natural habitat which play important role as biodiversity hotspot, patch of blocked secondary forest in the northern part of the PT DAS area which has the potential to be a habitat for RTE species. HCV Area 1 in the PT DAS area does not cover areas that have been planted with oil palm (north-eastern part of the management unit), and perished forest areas due to logging or fires (southern part of PT DAS area). Area of HCV 1 in PT DAS area is around 5 see Map 14.

Table 25: Situations which qualify as HCV 1

Requirements for HCV 1	Findings
A high overall species richness, diversity or uniqueness within a defined area when compared with other sites within the same biogeographic area	✓
Populations of multiple endemic or RTE species	✓
Important populations or a great abundance of individual endemic or RTE species, representing a substantial proportion of the regional, national or global population which are needed to maintain viable populations either: Year-round (e.g. key habitat for a specific species) or; Seasonally, including migratory corridors, sites for breeding, roosting or hibernation, or refuges from disturbance	✓
Small populations of individual endemic or RTE species, in cases where the national, regional or global survival of that species is critically dependent on the area in question	✗
Sites with significant RTE species richness, or populations (including temporary concentrations) of priority species approaching those of key protected areas or other priority sites (e.g. KBAs) within the same biogeographic boundary	✓
Particularly important genetic variants, subspecies or varieties	✓

notes: ✓ = present; ✗ = not present

Protected areas: a proxy concentration of biodiversity

Protected areas as a proxy indicator for biodiversity in the wider landscape are KHG (peat hydrological unit) and riverbanks as protected areas in Indonesia. Therefore, HCV 1 is present in the assessment area.

Richness, Diversity, or Uniqueness of Biodiversity

The assessment landscape is in a forest block covering ± 76,000 ha with peat forest occupying the largest proportion (± 73%). The Orangutan population in the assessment landscape is unknown, but some researchers show that the density of orangutans in lowland forests, including peat swamp forests, is higher than in hilly dipterocarp forests. The highest orangutan density for Borneo is 2-4 individuals/km² in dipterocarp lowland forest, freshwater

swamp forest, and mixed freshwater/peat swamp forest, while for hill dipterocarp forest only 0.3-0.5 individuals/km² (Morrogh-Bernard, et. al, 2003). Thus, the assessment landscape is considered to have high species uniqueness as an element of HCV 1.

Endemic Species and Restricted Range Species

There are eight endemic fauna species in assessment area: *Hylobates albibarbis*, only occupied West and Central Kalimantan (between the south of the Kapuas River and west of the Barito River); *Pongo pygmaeus wurmbii* is limited to the south-western part of the island of Borneo; while *Presbytis rubicunda*, *Nycticebus menagensis*, *Sus barbatus*, *Varanus borneensis*, *Lonchura fuscans* and *Pityriasis gymnocephala* are widespread on the Borneo Island including Sabah, Sarawak and Brunei Darussalam. The distribution of *Lonchura fuscans* covers the entire Borneo Island and its satellites.

Apart from fauna species, there are 18 endemic flora species of Borneo including: *Dryobalanops fusca*, *Shorea albida*, *Nepenthes fusca* and *Nepenthes bicalcarata*, and 5 species whose distribution is limited to Borneo and Sumatra. Restricted Range Species in very large areas such as Borneo and Sumatra are not indicators of the HCV area. The *Dryobalanops fusca* species is commonly found in sandy soil (the ecosystem of transplants of peat), in the assessment area this soil type is found in the northern part. Species *Shorea albida* and *Nepenthes bicalcarata* are commonly found in peat swamps, in the area of assessment of these species found only in areas of peat swamp forest that are still naturally covered. While *Nepenthes fusca* are scattered distributed in areas covered with forests or shrubs and are relatively easy to find throughout the island of Borneo.

Endemic fauna species, except *Lonchura fuscans*, are species that depend on the presence of forests. Forests in the assessment landscape occurred as a large and significant forest block and appear as a habitat for these endemic species. The distribution and magnitude of the population of endemic species found in the assessment landscape is unknown, but given the significant habitat available, the presence of these endemic species meets the criteria of the HCV element 1. Thus, in the PT DAS area HCV 1 associated with endemic species and restricted range species is all areas of natural forest.

Rare, Threatened or Endangered (RTE) Species

The assessment landscape recorded 24 RTE species, consisting of 13 fauna species and 11 flora species. The number of RTE species shows that the assessment landscape still has important species diversity. Thus, the presence of several RTE species in the assessment landscape has met the HCV 1 criteria.

There are 41 protected species recorded in the assessment area, consisting of 12 mammal species, 21 birds, 3 reptiles and 5 plants. Of all the protected species, 6 mammal species, 1 reptile and 1 plant are RTE species; and 2 endemic mammal species. Thus, protected species that meet the criteria as HCV 1 are covered by the criteria for RTE species and are endemic

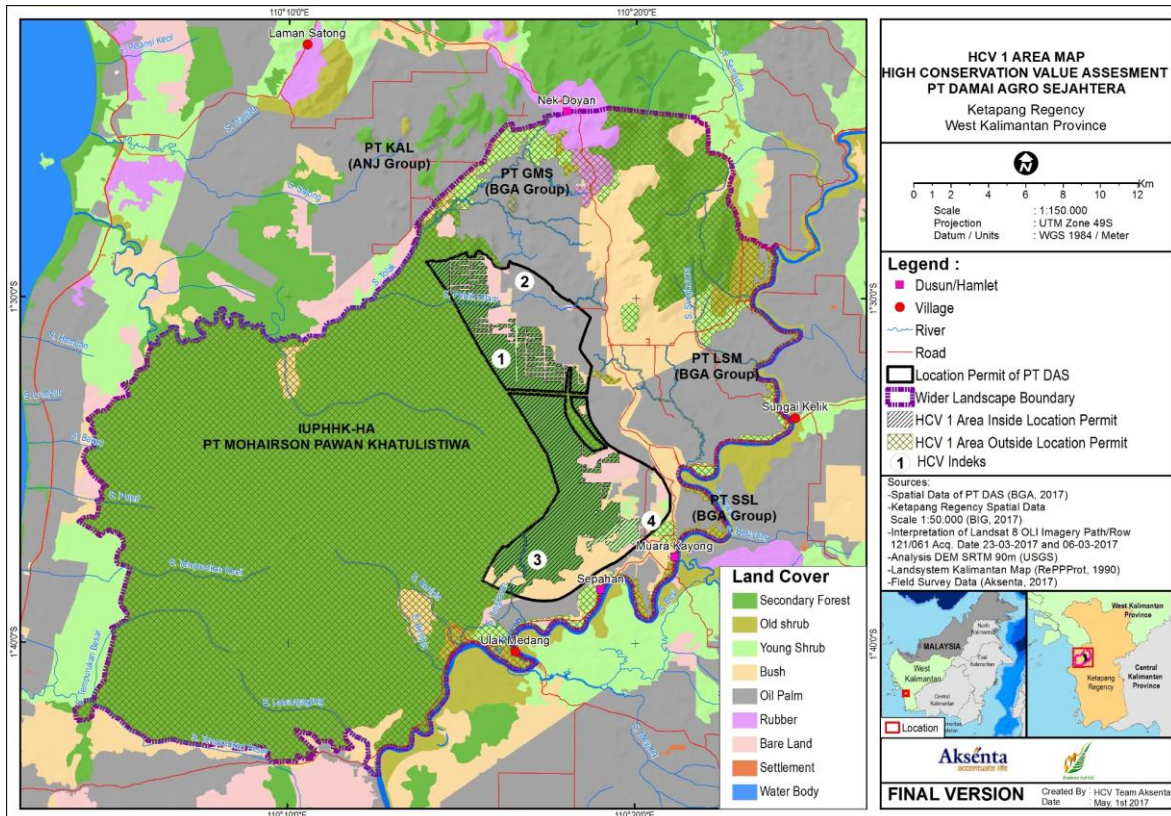
Spatial and Temporal Concentration of Species

The assessment area does not have roosting sites or breeding sites such as bat caves or trees where bat colonies perch. Study area is also not the main route for bird migration, and there is also no stop-over migratory wader or raptors site. In the study area there was also no

location for local migration of bearded pigs. Based on this situation, there is no consideration for spatial and temporal concentrations of species.

Important Genetic Variants, Subspecies or Varieties

Important sub-species variants in Kalimantan include three orangutan sub-species, namely *Pongo pygmaeus* in the north, *P.p. wurmbii* in the south (including around the assessment area), and *P.p. morio* in the northeast. Thus, subspecies of important genetic varieties, namely orangutan sub species *P.p. wurmbii* is occurred in assessment area.



Map 14: Map of HCV 1 areas in PT DAS landscape area

HCV 2: Landscape-level ecosystem, ecosystem mosaics and Intact Forest Landscapes (Present)

HCV 2 defines as an intact forest landscapes and large landscape ecosystems and ecosystem mosaics that are significant at the global, regional or national level, and which have an appropriate population of most natural species in natural distribution and abundance patterns (Brown et al., 2017). The result of this assessment indicates situation that qualifies as HCV 2 (Table 26).

The location areas of HCV 2 area is presented on Map 15. Areas within the Sungai Putri KEE area that have no forest cover or other natural vegetation, become HCVMA.

Table 26: Situation which Qualify as HCV 2

Requirements for HCV 2	Findings
Large areas (e.g. could be greater than 50,000ha, but this is not a rule) that are relatively far from human settlement, roads or other access. Especially if they are among the largest such areas in a particular country or region	✓
Smaller areas that provide key landscape functions such as connectivity and buffering (e.g. protected area buffer zone or a corridor linking protected areas or high quality habitat together). These smaller areas are only considered HCV 2 if they have a role in maintaining larger areas in the wider landscape	✗
Large areas that are more natural and intact than most other such areas and which provide habitats of top predators or species with large range requirements	✓

Notes: ✓ = present; ✗ = not present

Large Landscape

The largest forest landscape (IFL) in Kalimantan is in the central part of the island which is the main natural landscape of the Heart of Borneo (HoB). The distance between the assessment area and the HoB is 163 km. The closest IFL to the assessment area is located outside the western HoB with a 72 km distance. The assessment area is part of the KHG Pawan River - Sungai Tolak. This KHG area is about 113,800 ha (SK No 129/MENLHK/SETJEN/ PKL.0/2/2017, dan SK No 130/MENLHK/SETJEN/ PKL.0/2/2017). The results of spatial analysis of land cover show that around 47% (\pm 53,000 ha) of the area of KHG is still forest cover. The peat swamp forest area was later referred by several conservation institutions (including FFI, Greenpeace Indonesia, Wetland International Indonesia, YIARI, and supported by the government) as the Essential Ecosystems Area (KEE). KEE Sungai Putri has the widest remaining forest in Ketapang District therefore all areas with natural forest cover at KE Putri Sungai Putri qualify as HCV 2 ("Large area which is relatively far from human settlements, roads or other access").

Smaller Areas Providing Key Landscape Functions (e.g. Connectivity & Buffering)

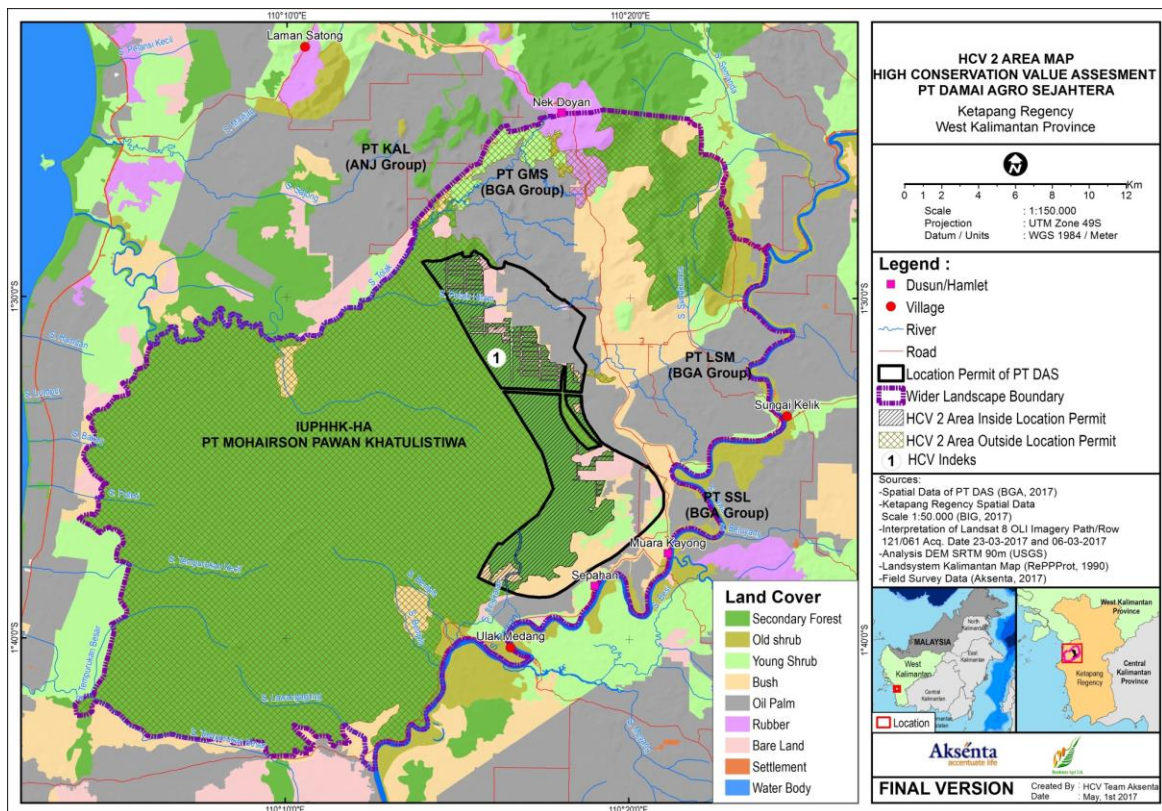
Sungai Putri KEE is the largest remaining forest in Ketapang District with an area of \pm 53,000 ha. Other areas in the same landscape that are still forested are Gunung Tarak Protection Forest (\pm 20,650 ha) and Gunung Palung National Park (\pm 90,000 ha). However, around the PT DAS location permit area there is no smaller forest area inside or adjacent to the assessment area which functions as buffer zone or corridor between forested areas mentioned above. Therefore, the criteria as HCV 2 requirements with these criteria are not met. Another area was found which served as a corridor connecting KEE Sungai Putri with the Mount Tarak Protection Forest. The area is outside the PT DAS Location Permit (in the north), which is inside the PT GMS concession. Thus, in the PT DAS Location Permit area there is no HCV 2 area with the criterion "Areas of smaller size that provide key functions for the landscape such as connectivity and support".

Larges Areas that more Natural and Intact

Sungai Putri KEE is an important habitat for orangutans (*P. p. Wrumbii*). Based on the survey in November-December 2017 conducted by YIARI and Wetland International Indonesia, the orangutan population in KEE are around 813-1204 individuals. The orangutan population is stated as the largest population in Ketapang District, the third largest in West Kalimantan Province after Gunung Palung National Park and Betung Kerihun National Park. The orangutan population in KEE is also thought to be the largest population outside the conservation area (YIARI, 2018). The criteria for HCV 2 are therefore deemed present as a viable population of naturally occurring species in natural patterns of distribution and abundance.

Ecotone

In the PT DAS Location Permit area there is one area that may have the character of Ecotone, a transition area between two biomes or two ecosystems. The area is located in the northern part of PT DAS Location Permit area, in the transition ecosystem between Peat Swamp Forest and Mixed Dipterocarp Forest. However, this area is very thin and the form as well as the wide area has not yet confirmed. In addition, this potentially Ecotone area includes in the HCV 3 area, not as HCV 2.



Map 15: Map of HCV 2 areas in PT DAS landscape area

HCV 3: Ecosystem and Habitats (Present)

HCV 3 defines as an ecosystem, habitat or refugia that is rare, endangered, or critically endangered. Identification of HCV 3 in this study uses criteria based on the Common Guidance for the Identification of HCV (Brown et al., 2017). Identification of HCV 3 in the field will lead to efforts to ensure the presence or absence of undisturbed or slightly disturbed

natural ecosystems. If a natural ecosystem is found, it is then referred to whether the ecosystem belongs to a rare or endangered ecosystem at the national or international level.

In the Common Guidance and Toolkit HCV Indonesia (2008) it is stated that ecosystem in Indonesia that has lost 50% or more of its original area in the bio-physiographic region is considered as HCV 3.

There are four criterias for ecosystems that meet the criteria of HCV 3, which are naturally rare; anthropogenically rare, endangered or critically endangered, and classified as threatened in national or international systems (Brown et al., 2017). The results of the field study show that the natural ecosystem criteria qualifies the HCV 3 (Table 27).

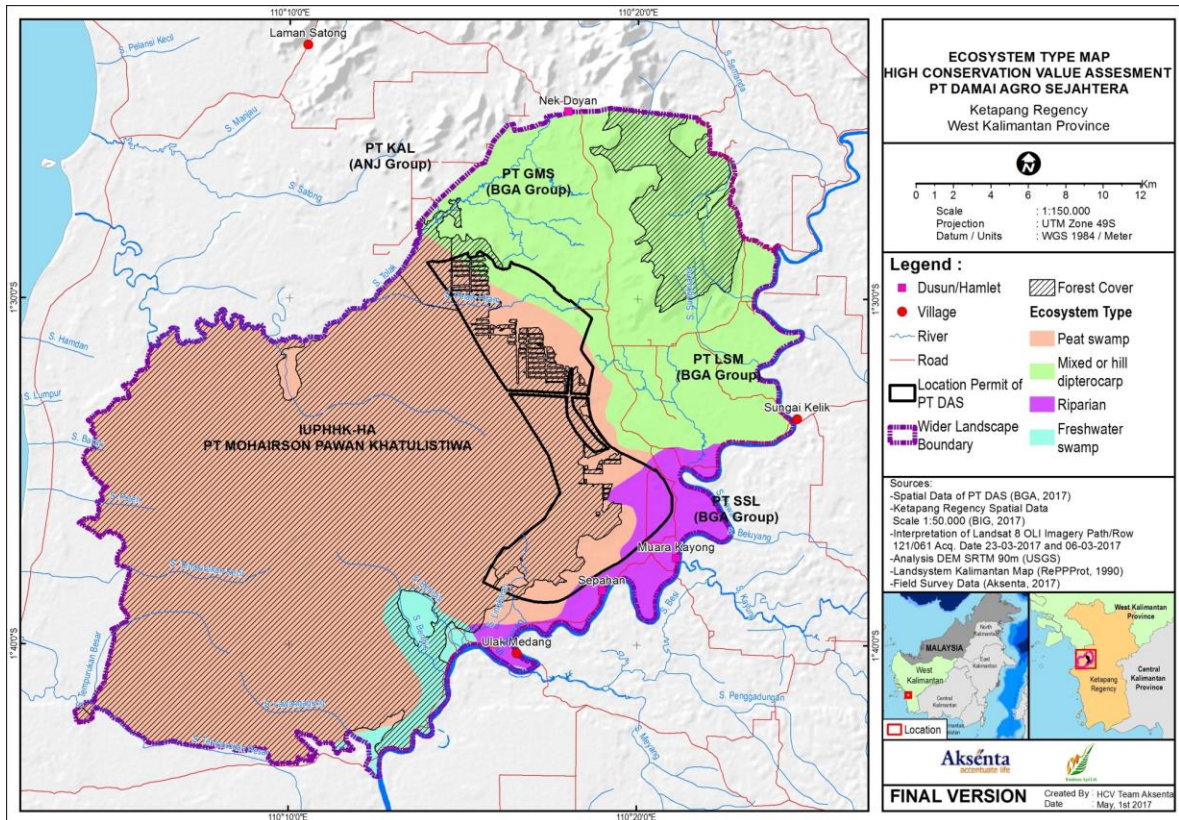
The results of the HCV 3 identification study using the Precautionary Approach (Indonesian Consortium for the Revised HCV Toolkit, 2008) show that in the PT DAS area there are several threatened ecosystems which are peat swamp forests, on the MDW land system (Mendawai) and GBT (Peat) as a peat swamp forest forest ecosystem; semi-natural scrub areas in the peat swamp, on the MDW (Mendawai) land system that has the potential to recover into the ecosystem of the Peat Swamp Forest through a natural succession process; and small forest fragments above the Honja (HJA) land system which is a mixed Dipterocarp forest ecosystem (Map 16).

Thus, it can be concluded that HCV 3 is found in the PT DAS Location Permit, in the form of a Peat Swamp Forest ecosystem and Mixed Dipterocarp forest ecosystem above igneous rock, with secondary forest cover. The largest part of this forested area is found almost along the western boundary of the PT DAS Location Permit area. The location of HCV 3 area is presented on Map 17.

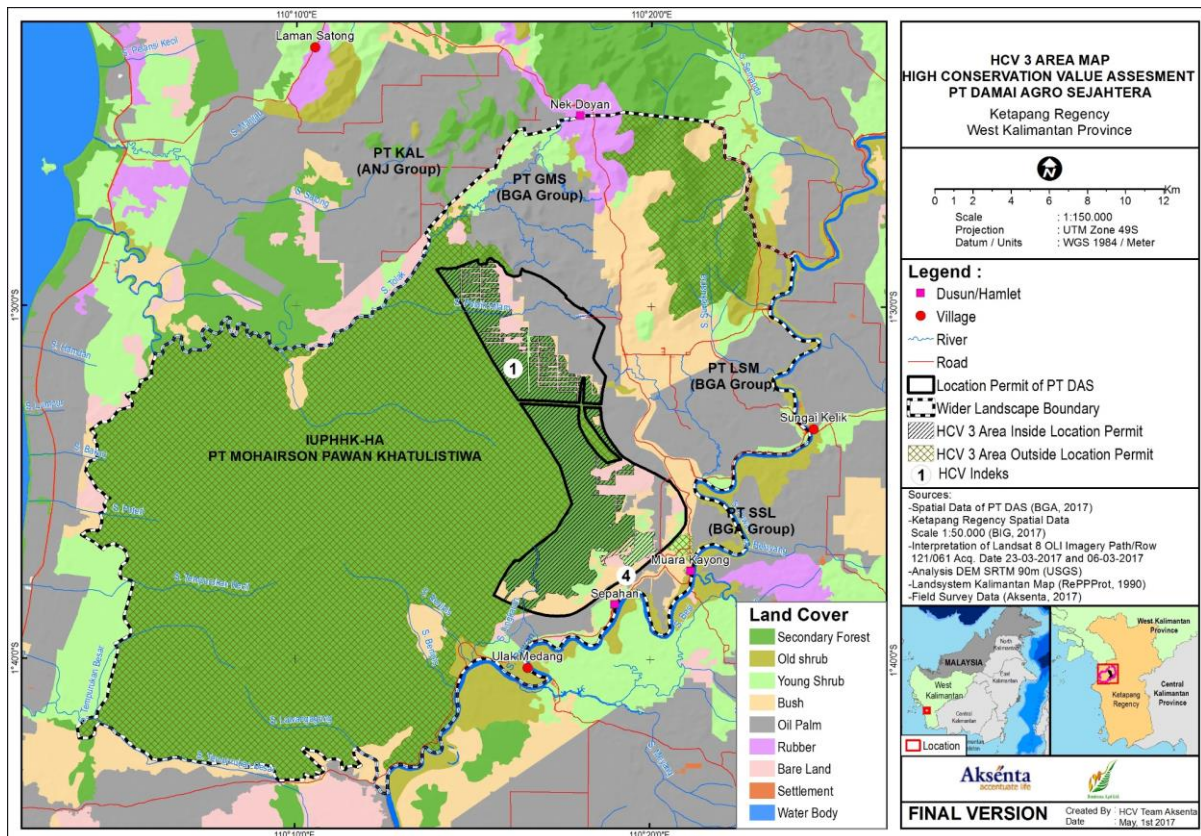
Table 27: Situations which Qualify as HCV 3

Qualify as HCV 3	Findings
Naturally rare because they depend on highly localized soil types, locations, hydrology or other climatic or physical features, such as some types of limestone karst forests, inselbergs, montane forest, or riverine forests in arid zones.	✘
Anthropogenically rare, because the extent of the ecosystem has been greatly reduced by human activities compared to their historic extent, such as natural seasonally flooded grasslands on rich soils, or fragments of primary forests in regions where almost all primary forests have been eliminated	✔
Threatened or endangered (e.g. rapidly declining) due to current or proposed operations	✘
Classified as threatened in national or international systems (such as the IUCN Red List of Ecosystems)	✔

Notes: ✔ = present; ✘ = not present



Map 16: Ecosystem types in PT DAS landscape area



Map 17: Map of HCV 3 areas in location permit of PT DAS

HCV 4: Ecosystem Services (Present)

Based on Brown et. al., 2017, there are situations that qualify as HCV 4 (Table 28). The situation assessment involves the existence of natural indicators found in the field, for example the existence of rivers and riparian zones, wetlands (swamps, lakes), the existence of forests / caves as pollinating agent habitat, the existence of hilly land with steep slopes and good vegetation. The survey result state that Pelaik Hitam River, Lingkaran River, and wetlands (peat land) are indicators in the assessment area. The existence of these indicators has six situations out of 10 situations that meet as a prerequisite as HCV4.

HCV 4 areas were found in the form of peatlands, the Lingkaran River and riparian zone, and Pelaik Hitam River and riparian zone. The distribution area of HCV 4 is presented on Map 18.

Table 28: Situations which Qualify as HCV 4

Qualify as HCV 4	Findings
Managing extreme flow events, including vegetated riparian buffer zones or intact floodplains	✓
Maintaining downstream flow regimes	✓
Maintaining water quality characteristics	✓
Protection of vulnerable soils, aquifers and fisheries	✓
Provision of clean water, for example where local communities depend on natural rivers and springs for drinking water, or where natural ecosystems play an important role in stabilizing steep slopes. These two values frequently occur together and the area which provides the critical services (water provision and erosion control) may overlap partially or completely.	✗
Protection against winds, and the regulation of humidity, rainfall and other climatic elements.	✓
Pollination services, for example exclusive pollination of subsistence crops provided by native bees for small-scale farmers in the highlands of Kenya, or for commercial Durian plantations by bats in Southeast Asia. In both cases, pollinating animals depend on the presence of suitable forest habitats and cannot survive in landscapes that are purely used for agricultural activities.	✗
Forests, wetlands, and other ecosystems that provide a boundary zone that protects from destructive fires that can threaten communities, infrastructure or other HCVs.	✓
Groundwater recharge zone.	✗
Grasslands providing buffering against flooding or desertification	✗

Notes: ✓ = present; ✗ = not present

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

There are several field indicators revealed during data collection related to the management of extreme water flow events and intact flood buffer i.e. water bodies (rivers, lakes, swamp) and naturally vegetated hilly terrain. The naturally vegetated hilly areas laid off outside assessment area, but there are several rivers run through the assessment area. The existence of the river channel is very important as the main drainage channel, especially during extreme rain events. The flow of the river flows water from the upstream catchment area to

its mouth so that there is no flooding on the land, including as a buffer of flooding around the river flow.

Protection of vulnerable soils and aquifers

The types of soil in the assessment area are mineral and organic / peat soil. Mineral land has been planted with oil palm and is well drained (potential for low groundwater absorption). Peat land dominates the assessment area (more than 80%). The thickness of peat soil varies (0.5-5 m) and the maturity level of peat is classified as fibrist-saprist. Shallow peat land (less than 1 m) has been planted with oil palm in 2004 - 2006. Peat with a thickness of more than 2 m generally still has good forest cover (no land clearing and drainage canals yet), except those that have been burned in the southern part. Land with peat thickness of more than 3 m is found in the central-western part of the PT DAS concession area, and around the southern moratorium area.

Peat soil is classified as vulnerable land. Excessive drainage on peat soil might cause descending soil surface (subsidence) and drought. A dry peat land is very flammable (contains high CO₂ emissions). The shrinkage of 1 meter thick peat will cause a loss of its ability to support water up to 90 cm, equivalent to 9,000 m³ / ha (Agus and Subiksa, 2008). Peat ecosystems that are damaged will require a very long time to recover. In addition, the opening of peat land that has a sulphide material layer (pyrite / FeS₂) causes oxidation of iron compounds because air exposure (producing Fe²⁺ + / Fe³⁺ + and sulphate) will increase the acidity of peat soil (Van Breemen, 1972). The reaction with clay particles, might release aluminium compounds (Al) which are included in one of the heavy metals, Bohn (2001).

Peatlands that function as protection are very deep peat which can store large amounts of water reserves (thickness more than 3 m). However, HCV 4 valued peatlands in the assessment area are all peatlands (peat depth > 50 cm) that are still forested and have not been disturbed by water management. As a form of caution, all shallow peat areas where most of the land cover has been opened due to very massive logging by the community, are designated as HCVMA GO AREA. The area supports the existence of HCV 4 area by preserving the surface water level, one of which is to protect the soil from heavy metal pollution such as iron (Fahmi at.al., 2012) and aluminium (Fahmi at.al., 2010).

Maintaining downstream flow regimes

There are 2 things related to the maintenance of the downstream flow regime, which is to keep water flowing in the river even in the dry season (contributing to baseflow) and reducing the maximum flow of the river, especially during the rainy season (reducing surface runoff). Most of the catchment area of the Lingkaran River are peat areas (from the western part of the PT DAS area to the PT MKS concession area). Peatlands have the capacity to accommodate very large rainwater and very slow drainage (low surface runoff). This condition contributes to the Lingkaran River flow during the dry season remains high.

Maintaining water quality characteristics

Riparian zones with good vegetation cover plays important role on maintaining river water quality characteristics. The river water quality is related to the content of pollutants derived from the results of land erosion, the application of agrochemicals on plantation/agricultural land (fertilizers, pesticides, herbicides). Riparian zones that are still well vegetated play as natural filter that filters the pollutants so they do not enter the river flow. The effectiveness of filtering pollutants depends on the type, density and height of vegetation in riparian zone.

The riparian zone of Lingkaran River is relatively in good condition, there is no land clearing for oil palm plantations or other uses. For the Pelaik Hitam River, some of the river segments have changed to oil palm plantations. The function as natural buffer has gone. This area needs further management (riparian zone rehabilitation) so the use of agrochemical may not pollute the river. Meanwhile, other riparian zones of the Pelaik Hitam River segment are still in good condition, still functioning as natural buffers for various pollutants that pollute the river.

Riparian zone function approach developed by Gumber et al. (2009) was applied to determine the width of the river buffer to maintain river water quality from pollutants. The width of the river buffer for filtering pollutants ranges between 6-50 m from the edge of the river cliff. The width of the river buffer for flood intersects with the width of the river buffer for pollutant, therefore the width of the Pelaik Hitam River buffer is 15 m and the Lingkaran River is 50 m.

Provision of clean water

The location of the residents of Ulak Medang Sub-village, Sepahan Sub-village, and Muara Kayong Sub-village are located around the Pawan River. The residential area is not located in the estuary of the Lingkaran river or the Pelaik Hitam river. The Sepahan community uses the Lingkaran river only as a means of transportation and fishing grounds. The main water source is from the Pawan river (there is also ground water from the wells). River water in the assessment area is very acidic (mixed with peat water). This does not automatically make rivers in the assessment area a source of clean water.

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

The assessment area is a very flat area, the wind speed is in the normal range. So far there has never been an event that the wind blew very hard. There is also no natural feature acts as a wind break or wind shelter, like a pine tree on the beach.

Natural ecosystem plays an important role in stabilizing the steep slopes

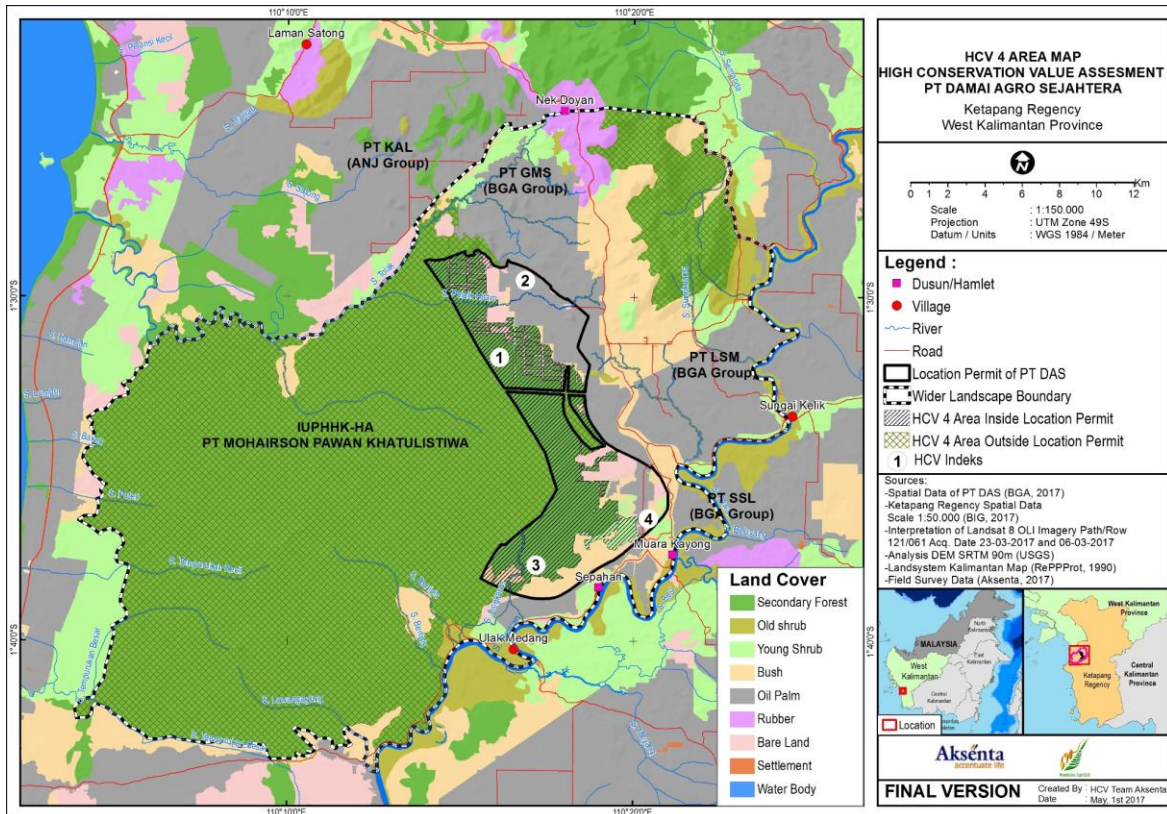
The topographic condition of the assessment area is very flat (slope is less than 3%). No land with very steep slopes (slopes of more than 25%), so there are no ecosystem services that play an important role in stabilizing steep slopes in the assessment area.

Pollination services

Based on discussions with villagers and field observation, there were no community-owned fruit gardens (*kelekak*) in the assessment area. This is because the location of PT DAS is quite far from the village settlement location and the village community does not have enough resources for gardening on peat land.

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

There is no river body that is wide enough as a natural firebreak to avoid fires or protect from fires in the assessment area. The river around the assessment area that meets these requirements is Sungai Pawan, but is outside the assessment area.



Map 18: HCV 4 area in PT DAS landscape area

HCV 5: Community needs (Present)

Based on Brown et. al., 2017, there are a number of situations that qualify as HCV 5 (Table 29). Based on the results of consultations with local communities, it was found a situation that qualified as HCV 5, namely there were several family households from Muara Kayong and Sepahan Sub-villages (Sungai Kelik Village) who still used the Pawan River and Lingkaran River as fishing grounds and water sources for sanitation. According to the local community, the majority of the people currently conducting fishing activities are only alternative livelihoods, but there are some family households who earn a living as fisherman, so the existence of these rivers is important to be protected.

HCV 5 areas were found in the form of rivers used by the community to catch fish and other freshwater species, and water sources. The river used as a fishing ground is located in the PT DAS Location Permit, the Lingkaran River, while the river used as a source of water for sanitation, Pawan river is located outside the PT DAS area. Distribution of HCV 5 in the PT DAS Location Permit area and assessment landscape is presented on Map 15.

Table 29: Situations which Qualify as HCV 5

Qualify as HCV 5	Findings
Hunting and trapping land (for game meat, skin and fur)	✘
NTFP (non-timber forest products) such as beans, berries, mushrooms, medicinal plants, rattan	✘

Qualify as HCV 5	Findings
Fuels for household cooking, lighting and heating	✘
Fish (as essential source of proteins) and other freshwater species relied on by local communities	✓
Building materials (poles, thatching, timber)	✘
Fodder for livestock and seasonal grazing	
Water sources necessary for drinking water and sanitation	✓
Items which are bartered in exchange for other essential goods, or sold for cash which is then used to purchase essentials including medicine or clothes, or to pay for school fees	✘

Notes: ✓ = present; ✘ = not present

Hunting

Hunting and trapping activities carried out by some local people are not considered as main source of livelihoods, but merely recreational activities for leisure time. There is no hunting system that is regulated by custom, there is no special area, and it is extractive in nature so that it can pose a serious threat to the existence of wildlife. There have been many alternatives to meet protein needs, such as buying meat on the market and raising livestock. Based on the results of the consultation, it was concluded that hunting and trapping activities carried out by local communities, especially the Dayak Tolak Sekayu community from Nek Doyan Sub-village did not qualify as HCV 5.

NTFP (non-timber forest products) such as beans, berries, mushrooms, medicinal plants, rattan

The results of interviews and consultations with the community revealed that local communities currently no longer use non-timber forest products (NTFPs) as their source of livelihood, because there is no more market available. The use of NTFPs for *jelutung* sap has occurred in 1980-1990s.

Fuels for household activities such as cooking, lighting and heating

The results of consultations and observations, the majority of people currently use subsidized liquefied petroleum gas (LPG). For people who still use firewood, they take it from the garden, and there is no special place as a source of firewood. The reason for use of wood for fuel in households is not because of low financial capacity, but because it tends to habits and taste of food. People considered the price of 3 kg LPG is still affordable, and its availability is guaranteed throughout the year.

Fish (as the main source of protein) and other freshwater species that are used by local communities

Fishing activity is not main source of fulfilling the most basic needs of the local community. However, there are some people from Muara Kayong and Sepahan Sub-villages who are still dependent on fish and other freshwater species. Pawan River and the Lingkaran River are important places for fish finders, therefore it considered as HCV 5.

Building materials

According to the local community, most of the wood demand for building materials was obtained by buying from illegal logging. Timber is logged from production forest areas,

protected forests, and from other places as long as there are still trees. The timber source area is not controlled or owned individually/communally/village/custom, but on the claim of investors or individuals who work with timber entrepreneurs. Therefore, the use of wood for this building material is not considered to qualify as HCV 5.

Fodder for livestock and seasonal grazing

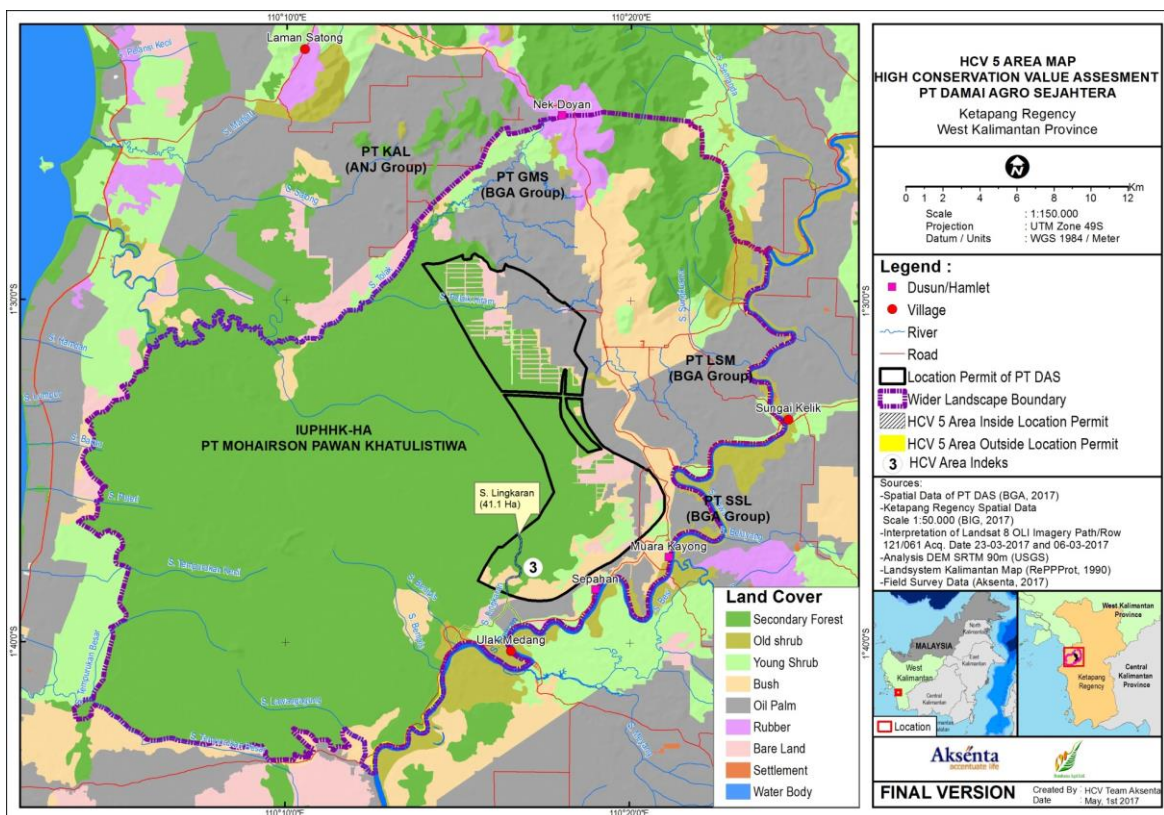
Local community is only having small scale livestock farm which would not need certain areas for razing. Then, the community does not have the habit of collecting animal feed sourced from the forest. Animal feed for chickens and pigs is usually obtained from household food waste. This situation is not considered to meet HCV 5 requirements.

Water sources necessary for drinking water and sanitation

Pawan River is used by some people for sanitation, while for drinking they use well water and bottled water (purchase). Pawan River is outside the concession, so it does not considered as HCV 5 areas inside the company's concession area.

Items which are bartered in exchange for other essential goods

At the present, the source of livelihood for the local community is relied on oil palm plantation companies, independent plantations (rubber and oil palm), agriculture, commercial logging and trading. Today, no natural items are exchanged with essential items. According to the local community, forest products such as *jelutung* sap currently have no economic value because there are no buyers for the product.



Map 19: HCV 5 area in PT DAS landscape area

HCV 6: Cultural values (Present; outside Management Unit of PT DAS)

Based on Brown et. al. (2017) there are a several situations that qualify as HCV 6 (Table 30). Based on the results of consultation with the community in the assessment area, there is a

situation that qualifies as HCV 6, i.e. a site that has important historical, cultural, and religious values in the Nek Doyan Sub-village area. But the location of the site is located outside the PT DAS Location Permit area. For Sepahan and Muara Kayong Sub-villages, no situation was found that qualifies as HCV 6.

Table 30: Situation which Qualify as HCV 6

Qualify as HCV 6	Findings
Sites that are recognized by national policies and legislation have high cultural values	✘
Sites that have official assignments from national governments and / or international institutions such as UNESCO	✘
Sites with important historical and cultural values are recognized, even if not protected by legislation	✓
Religious or sacred sites, burial grounds or sites that are used as locations for holding traditional ceremonies that have an important role for local or customary communities.	✓
Plant or animal resources that have totem values or are used in traditional ceremonies	✘

Notes: ✓ = present; ✘ = not present

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

National policies and legislation stipulate 15 cultural reserves in the West Kalimantan Province, and none of them are in the PT DAS location permit.

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

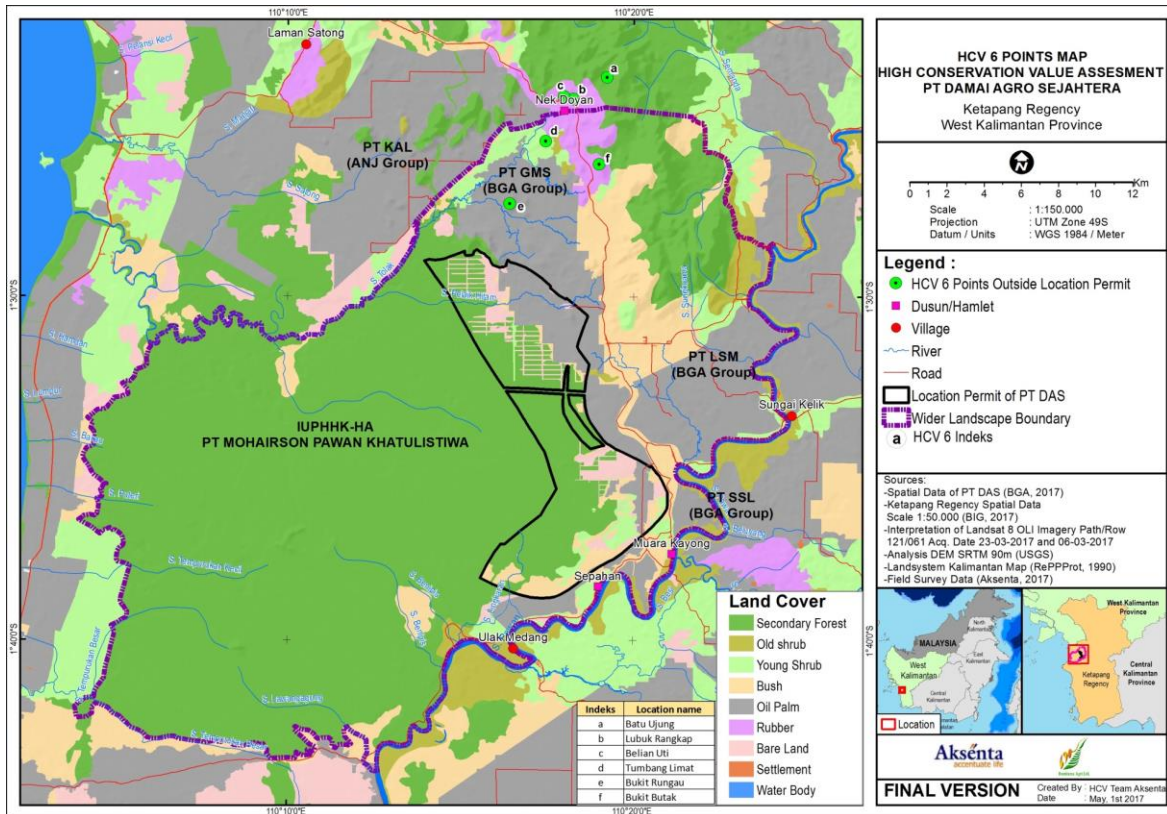
There is no site or location falls into this category. Furthermore, there is no cultural sites on the island of Borneo based on UNESCO platform, but there were three natural sites included in the temporary list, namely Betung Kerihun National Park, Sangkulirang - Mangkalihat karts area, and Derawan Islands.

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

Sites that have religious or sacred values are found in the Nek Doyan Sub-village used by sub-village residents (Dayak Tolak Sekayu) to practice traditional ceremonies. The sacred areas are Batu Ujung, Lubuk Rangkap, Tumbang Limat, Bukit Rungau and Bukit Butak, all of which are located outside the PT DAS location permit area (Map 16).

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

The Dayak Tolak Sekayu community still practices traditional ceremonies related to shifting cultivation activities. In carrying out these traditional ceremonies, they do not use certain animal or plant resources, and the food and drinks eaten together are obtained from the results of farming, livestock and purchasing. No animal or plant resources were used as a condition for traditional ceremonies or totem values.



Map 20: HCV 6 point locations in landscape area of PT DAS

Stakeholder Consultation

Stakeholder Consultation is carried out through interview and dialogues with representatives of local key stakeholders including indigenous and local communities, field managers, academics, NGOs, and relevant local governments. Stakeholder Consultation aims to (i) collect information regarding the social and environmental situation in the assessment area, to contribute to the HCV identification and decision making process; (ii) eliminate differences in information, where information is held by stakeholders; (iii) provide information about the potential impact of operations on HCV; (iv) identify possible approaches to avoid, mitigate or compensate for the negative impacts of operations; (v) collect various perspectives and recommendations about threats and management options; (vi) ensure transparency of the process of assessment and credibility of decisions taken.

Consultation at the preliminary assessment stage is carried out through interview and discussions to comprehend the main issues, social and environmental characteristics in the assessment location (Table 16). The assessment team visited the IAR Foundation, FFI, Palung Foundation, ASRI, BKSD, and PT DAS management units.

Table 31: Summary of public consultation results

Date	Name	Title/Role	Organisation/ Social group	Key concerns & recommendation (with Team response)
Consultation during Scoping Study				
21 March 2017	Gail Campbell-Smith	Program Manager	IAR Foundation	The Assessment Area is situated in Sungai Putri landscape, peatland and important habitat of orangutan Sungai Putri block is designated as KEE by the Government, NGOs, company and community. Presence of corridor is important to connect to orangutan habitat <i>Team response: The HCV area includes orangutan habitat and corridors that connect all important areas of the Sungai Putri landscape</i>
21 March 2017	Tito	FFI staff at Ketapang	Flora Fauna	FFI do not have a program in the assessment area. FFI

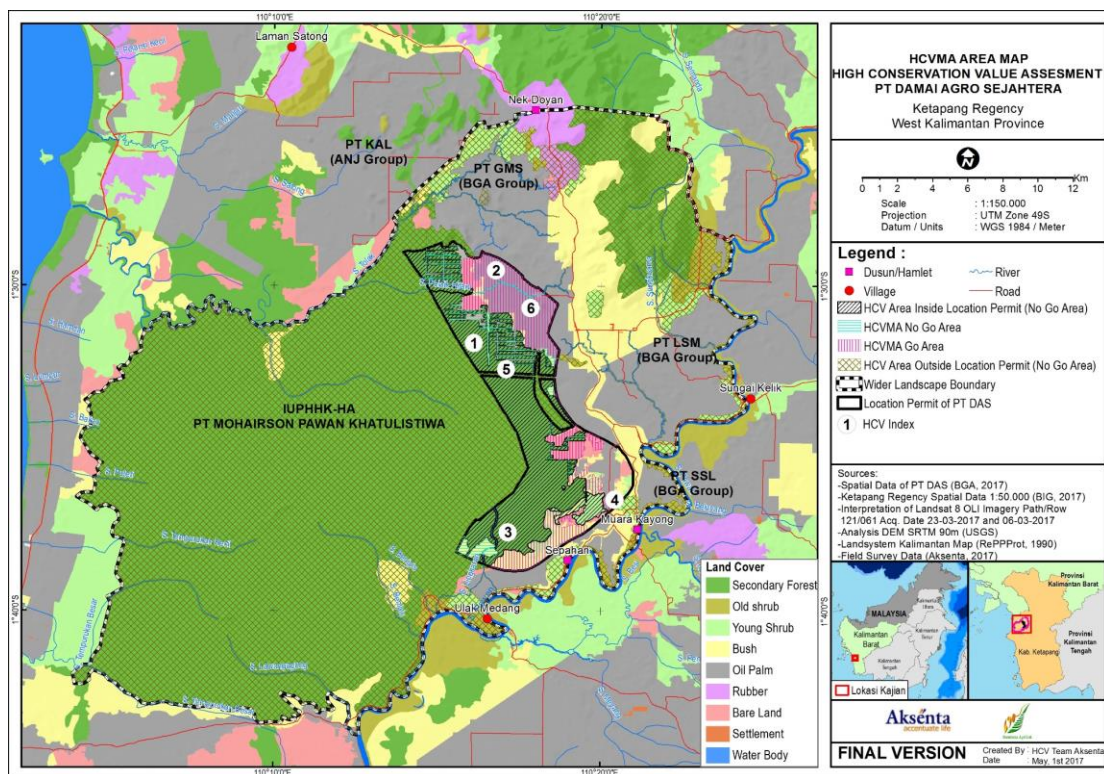
Date	Name	Title/Role	Organisation/ Social group	Key concerns & recommendation (with Team response)
		Office	International	concentrate on the development of Laman Satong Village Forest in Manjau Sub-village through the REDD program. <i>The location of Manjau Sub-village is far from the assessment area, but if there is village forest in the assessment area, it will be considered.</i>
22 March 2017	Ranti Naruri	Palung Foundation staff	Palung Foundation	People around the Sungai Putri landscape live from logging. Animal hunting rate is very high, Pangolin, Deer, Hornbill, Orangutan and other are sold to middleman in Sandai. The presence of oil palm plantation companies can be an alternative community livelihood
22 March 2017	Jonhson	Project Manager	Alam Sehat Lestari Foundation (ASRI)	The focus of the ASRI program is only in sub-villages around Gunung Palung National Park. Logging around Gunung Palung National Park and HL Gunung Tarak National Park has been occurring since 1989, performed by communities around the forest. There is a positive side to oil palm plantations, changing loggers to oil palm workers/farmers.
22 March 2017	Agustinus Batubara	Staff	BKSDA, Ketapang	Some RTE species occurred inside and outside PT DAS area, it is important to provide wildlife corridors. Orangutans need a large area for their movement, which is expected to be undisturbed by companies and local communities in the context of plans to develop oil palm plantations Orangutan is considered as pest, so companies and communities together hunt them down, this can threaten the Orangutan population.
Consultation during Presentation of Assessment Result				
3 April 2017	Yuan Abian	Regional Environmental Agency (BLHD) staff	Regional Environmental Agency (BLHD)	In the PT DAS concession there are indications of peatland as large as 1881 Ha, there are also three rivers run through it. Please confirm the existence of the river, because Ketapang district maintains 3 river areas: S Pawan, S Tolak and S Kayong, the banks are at least 100m HCV areas that have been identified so that they are given signs or stakes, so that if the management changes, the physical form of the HCV area remains The results of field verification, there are only 2 rivers, namely Pelaik Hitam river in the north and Lingkaran river in the south <i>Suggestions for installing a signboard will be a recommendation for this HCV report</i>
3 April 2017	Agustinus Batubara	BKSDA staff	BKSDA Ketapang	In the assessment area there are still protected animals, it is important to provide wildlife corridors. Orangutans need large areas of movement, expected to be undisturbed by companies and local communities. Orangutans are considered pests so they can threaten the orangutan population. Inviting the public and all parties not to hunt, kill and maintain orangutans. <i>The team conducted data collection on orangutan nests in the assessment area and reviewed important habitat and corridors for orangutans as part of the HCV area</i>
3 April 2017	Aryanto	Community leader	Sungai Kelik Village	Worried about HCV assessments such as AMDAL, the results are not publicly accessible. <i>The results of the HCV assessment are not permitted directly to the community. The results of the assessment can be gained at www.hcvnetwork.org if it has been uploaded to the HCVRN</i>
3 April 2017	Abdul Kadir	Community member	Muara Kayong Sub-village	Community worried that orangutan conservation takes up land for them. Orangutan must be moved to other areas outside the assessment area so that PT DAS operations can run. Community worried that HCV area will reduce the area of

Date	Name	Title/Role	Organisation/ Social group	Key concerns & recommendation (with Team response)
				community partnership plantation <i>Coexistence between local community and orangutan is a consideration. The HCV area is expected to be a solution and can reduce wildlife conflicts. It is possible that the partnership area is reduced, but the company can operate.</i>
3 April 2017	Eris Suanda	Sub-village Leader	Muara Kayong sub-village	The presence of oil palm companies has helped the economy of the residents of Muara Kayong Sub-village. However, PT DAS needs to conduct socialization regarding plantation development plans, HCV area management plans and corporate social responsibility (CSR) program plans. <i>Recommendation for the company so that after the HCV assessment immediately plans for HCV management and monitoring.</i>
3 April 2017	Ejar Suandi	Village Leader	Sungai Kelik Village	Appreciation for Aksenta who has communicated with the community. I hope that communication like this will continue with the management of PT DAS under the BGA.
3 April 2017	Anji	Conservation staff	PT. KAL	Regarding Orangutans, PT KAL conducted a survey with the IAR Foundation and recorded 140 Oranutan in the PT KAL area. How to deal with Orangutan conflicts with people/human? Regarding land fires is another important issue in this region <i>In emergency situation, interactions with potential conflict may have negative impact. Staff and community need to be equipped with knowledge, tools and adequate skill for interacting with orangutan.</i> <i>RSPO already recommends peatland water system management in its Best Management Practice (BMP).</i>

Table 32: Description and location of HCV area and HCV Management Area

Index	HCV Type	Location	Description/baselin condition	Indicative boundaries	Size (ha)*
1	1,2,3,4	Peat Swamp Forest and Mixed Lowland Dipterocarp Forest	<ul style="list-style-type: none"> • Areas of distribution of orangutans, part of a wider landscape of peat swamp forests • Depth varies, middle part to the western boundary is the classified as deep peat • The condition of land cover in deep peat is relatively good (forest) • The condition of land cover in shallow peat has been degraded because of massive logging by the community 	undisturbed peat land	4,867.3
2	1,2,3,4	Pelaik Hitam River and its riparian zone	<ul style="list-style-type: none"> • Some riparian zone areas have been converted into oil palm plantation, but some have not been disturbed (still natural) • The water condition has been very turbid since at the river inlet 	Buffer of 15 m	7.6
3	1,2,3,4,5	Lingkar River and its riparian zone	<ul style="list-style-type: none"> • There is no land clearing for plantation activities • The condition of vegetation around riparian zone is still good • The upstream part experienced a lot of logging by the community • The downstream is prone to fire • Fish is an important commodity 	Buffer of 50 m	31.6

Index	HCV Type	Location	Description/baselin condition	Indicative boundaries	Size (ha)*
4	1,3,4	Peatland area with semi-natural vegetation cover	<ul style="list-style-type: none"> • land cover type is shrubs • Some areas have been logged by local people • There are seedlings/saplings of peat swamp forest ecosystems • No artificial drainage • Vegetation in this area can still recover by natural succession 	Shrub area with natural drainage that is still connected with peat swamp forest	252.3
5	HCVMA – No Go Area	Areas with disturbed vegetation in peat swamp forests, river banks which cross gardens, and mixed diptokarp ecosystems. The natural condition of the area needs to be restored	<ul style="list-style-type: none"> • Some peat swamp fragments • The border of the Pelaik Hitam River which has been planted with oil palm • Mixed dipterocarp forest fragments • The land cover types are shrub, bush and open land • Some areas have been blocking by the company and some are burned land • The condition of the peat swamp forest and mixed dipterocarp forest can still recover by natural succession • Riparian zone should be revegetated 	Secondary peat swamp forest area, river border, and mixed dipterocarp forest area	703.0
6	HCVMA – Go Area	Orangutan distribution area, peat area with a depth of > 0.5 m, and Sungai Putri KEE area	<ul style="list-style-type: none"> • Land cover types: oil palm plantation, open land, shrub and bush • This area can be managed for oil palm plantation by managing water management on peatland and managing wildlife species (avoiding human-wildlife conflicts) 	Peatlands that are converted to oil palm, open land, shrubs and shrubs	2,715.6
Total Size of HCV and HCVMA (ha)					8,577.4
Size of the Location Permit of PT DAS (ha)					9,444.6
Percentage of the size of HCV and HCVMA compared to the Location Permit of PT DAS (%)					90.8



Map 21: HCV and HCVMA areas in the PT DAS and its surrounding

3.4 Carbon Stock and High Carbon Stock (HCS) Assessment

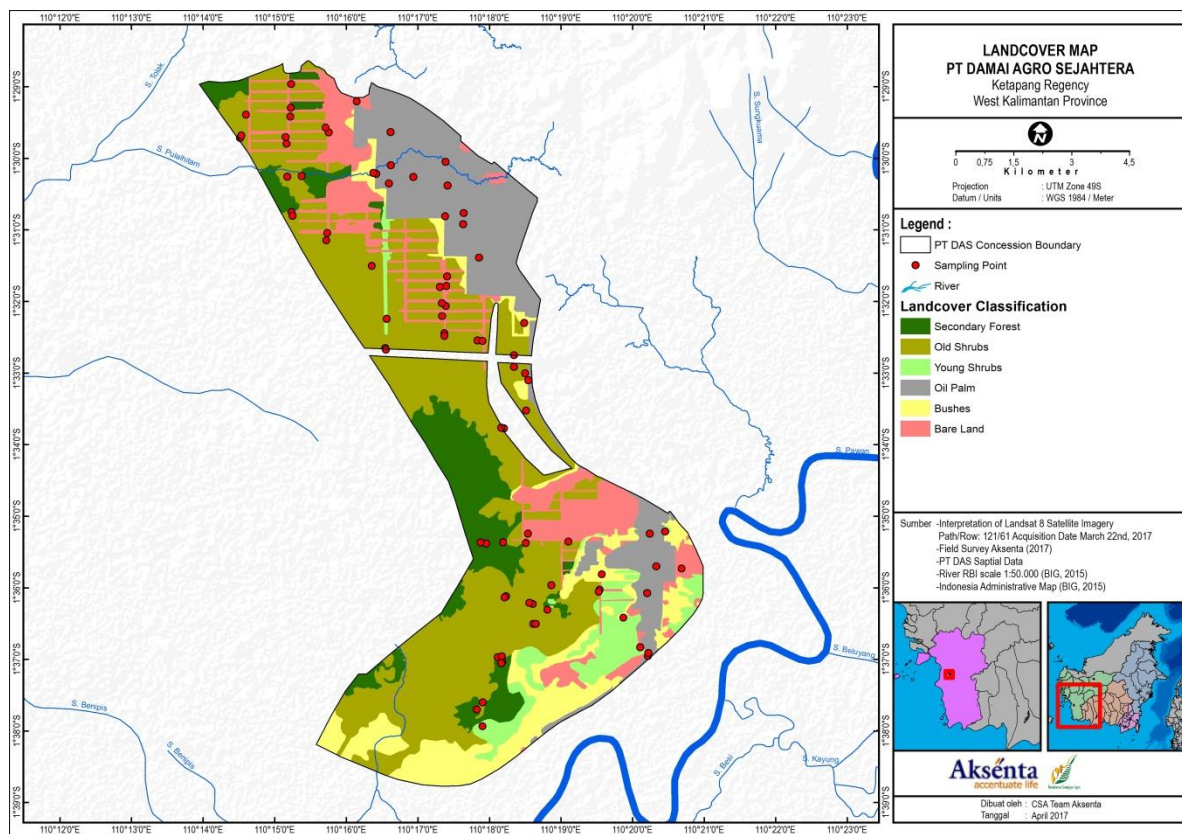
Initial studies focused on the land cover analysis, using the Landsat 8 OLI satellite imagery OLI TIRS path/row 121/61 with the acquisition date of 10 February 2017, Landsat 8 OLI satellite imagery OLI TIRS path/row 121/61 with the acquisition date of 06 March 2017 and Landsat 8 OLI satellite imagery OLI TIRS path/row 121/61 with the acquisition date of 22 March 2017, to determine the stratification of the vegetation cover. Land cover classification, as the basis for determining the number and the placement of sample plots - at the preparation stage - as well as the extrapolated value of carbon stocks - at the analysis stage -, refers to the classification of land cover ISO 7645 (National Standardization Agency, 2010), carried out through the interpretation of satellite imagery band 654 and band 653 is not guided by the classification method (unsupervised classification).

Table 33: Results of the interpretation of satellite data prior ground truthing

Land cover	Area*	
	(ha)	(%)
Secondary Forest (Hutan Sekunder)	1022.1	10.8
Young Shrub (Belukar)	3884.5	41.1
Bush (Semak Belukar)	488.3	5.2
Shrub (Semak)	1062.0	11.2
Oil Palm (Kelapa Sawit)	1730.7	18.3
Open Land (Lahan Terbuka)	1256.9	13.3
Total	9444.6**	100

*) Source: the interpretation of Land Use Change Analysis, Aksenta 2017

**) Area based comprehensive GIS (shp boundary PT DAS)



Map 22: Landcover Map of PT DAS

Above Ground Biomass (AGB)

The number and placement of sample plots sampled in the field is determined by the sampling method stratified random sample (stratified random sampling) representing each land cover classes derived from the interpretation of satellite images. The total number of plots are 84 plots, divided into 17 plots of Secondary Forest (HS), 39 plots of Old Shrub (BL), 5 plots of Young Shrub (SB), 6 plots of Bushes (SM) and 17 plots of Oil Palm (KS). AGB measured in the field consists of plant organs which are located above ground level. Value biomass on the surface of each plot and stratum is the average value per unit area (ha) extrapolation of measurements at plot level.

Table 34: Simplified mention for each land cover

Strata	Land Cover Class
HS	Secondary Forest (Hutan Sekunder)
BL	Old Shrub (Belukar)
SB	Young Shrub (Semak belukar)
SM	Bushes (Semak); Bare Land (Lahan Terbuka); Oil Palm YoP 2016 (Kelapa Sawit tahun tanam 2016)
KS	Oil Palm (Kelapa Sawit)

Table 35: Estimated value of Above Ground Biomass in plot level, PT DAS 2017

Strata	Above-ground biomass (ton/ha)					Uncertainty (CI-95%)(%)	Coefficient of Variation (%)
	Average	Minimum	Maximum	StDev	Std-error		
HS	110.1	63.9	143.3	24.2	5.9	10.6	21.9

BL	77.5	53.6	105.0	14.2	2.3	5.9	18.4
SB	38.8	28.8	55.2	10.4	4.7	24.0	26.9
SM	9.6	0.2	16.1	7.3	3.0	62.1	76.2
KS2004	93.9	91.7	96.0	1.8	0.9	1.9	1.9
KS2005	69.7	63.5	72.6	3.7	1.6	4.7	5.2
KS2006	57.8	57.6	58.5	0.4	0.1	0.5	0.6

Source: Primary data of Assessment done by Aksenta, March 2017

Below Ground Biomass (BGB)

Below Ground Biomass (BGB) is a root biomass of a stand. Fitkau and Klinge studies (1973) show that the BGB value is 0.37 of the AGB value so that the Below Ground Biomass (BGB) value for each strata tend to have the same distribution as the Above Ground Biomass. The BGB value in this plot level is used to generate carbon stocks derived from BGB by utilizing the relationship between BGB and AGB at the plot level.

Table 36: Estimated value of Below Ground Biomass in plot level, PT DAS 2017

Strata	Below-ground biomass (Mg/ha)					Uncertainty (CI-95%)(%)	Coefficient of Variation (%)
	Average	Minimum	Maximum	StDev	Std-error		
HS	40.7	23.6	53.0	8.9	2.2	10.7	22.0
BL	28.7	19.8	38.8	5.3	0.8	5.9	18.4
SB	14.4	10.7	20.4	3.8	1.7	23.8	26.6
SM	3.5	0.1	6.0	2.7	1.1	62.3	76.0
KS2004	34.7	33.9	35.5	0.7	0.3	1.9	1.9
KS2005	25.8	23.5	26.8	1.4	0.6	4.7	5.3
KS2006	21.4	21.3	21.7	0.1	0.1	0.5	0.6

Source: Primary data of Assessment done by Aksenta, March 2017

Carbon Source of Necromassa; Woody Debris and Litters

The carbon source derived from necromassa in this study is grouped into two; (i) wood or dead trees (*woody debris*) dan (ii) litters. Necromassa of dead wood is calculated based on the volume of wood and its specific gravity according to its weathering rate. Necromassa from the litter is the result of weighing the dry weight of the samples taken in the field.

Table 37: Estimated value of Litter Necromass in each land cover class, PT DAS 2017

Strata	Litter Necromass (Mg/ha)					Uncertainty (CI-95%)(%)	Coefficient of Variation (%)
	Average	Minimum	Maximum	StDev	Std-error		
HS	13.8	9.6	20.5	3.1	0.8	10.9	22.5
BL	9.9	4.0	18.0	3.4	0.5	10.2	34.5
SB	2.7	1.5	3.8	0.8	0.4	27.5	30.8
SM	1.2	0.04	4.9	1.9	0.8	127.8	156.5
KS2004	0.0	0.0	0.0	0.0	0.0	22.8	22.7
KS2005	0.6	0.1	0.9	0.4	0.2	65.1	72.9
KS2006	0.1	0.1	0.1	0.0	0.0	11.8	15.6

Source: Primary data of Assessment done by Aksenta, March 2017

Table 38: Estimated value of Dead Wood Necromass in each land cover class, PT DAS 2017

Strata	Dead Wood Necromass (Mg/ha)					Uncertainty (CI-95%)(%)	Coefficient of Variation (%)
	Average	Minimum	Maximum	StDev	Std-error		
HS	10.6	0.0	17.4	7.0	2.9	53.6	65.8
BL	8.3	1.5	22.8	6.5	1.5	35.1	78.4
SB	1.3	0.7	2.3	0.7	0.4	59.7	57.5
SM	6.1	0.01	24.3	10.5	4.7	153.4	171.4
KS2004	1.3	1.0	1.7	0.3	0.1	21.8	21.8
KS2005	1.4	1.1	2.4	0.6	0.3	35.8	40.0
KS2006	2.0	1.1	2.8	0.8	0.3	29.2	38.5

Source: Primary data of Assessment done by Aksenta, March 2017

In order to facilitate the discussion and mapping of the carbon stocks from the biomass, we classified the average value of the biomass on the surface per unit area:

- B1 : area with AGB 0-20 ton/ha
- B2 : area with AGB 20-40 ton/ha
- B3 : area with AGB 40-60 ton/ha
- B4 : area with AGB 60-80 ton/ha
- B5 : area with AGB 80-100 ton/ha
- B6 : area with AGB 100-150 ton/ha
- B7 : area with AGB 150-152.9 ton/ha

Classification of the AGB value per unit area could illustrate the condition of land cover. Some research results on carbon stocks from forest stand AGB shows that the value of biomass in the range B6-B7 is secondary forest, B3-B5 is scrub, B1-B2 is shrubs and open land.

Table 39: Area according to the distribution of biomass classes in each strata of land cover

Strata	Area by AGB (Ha)							Total (Ha)**
	B1	B2	B3	B4	B5	B6	B7	
HS	-	0.8	53.5	174	248.4	523.6	21.7	1,022.10
BL	-	42.8	1,436.90	688.9	1,538.30	177.6	-	3,884.5
SB	61.3	361.7	68.8	0.0	0.0	-	0.0	491.8
SM	2,169.20	149.7	-	-	-	-	-	2,318.9
KS2004	-	-	-	162.4	358.6	-	-	521.0
KS2005	-	-	330.4	296.4	-	-	-	626.9
KS2006	1.0	18.0	288.1	272.2	-	-	-	579.4
Total	2,231.51	573.04	2,177.73	1,593.97	2,145.28	701.20	21.70	9,444.60

Source: Data from Field Survey Analysis

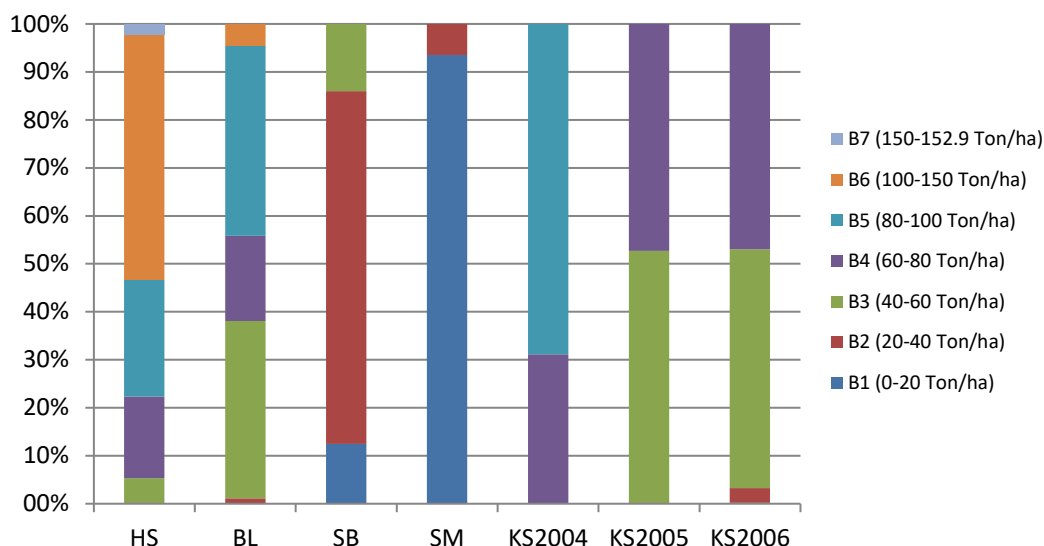
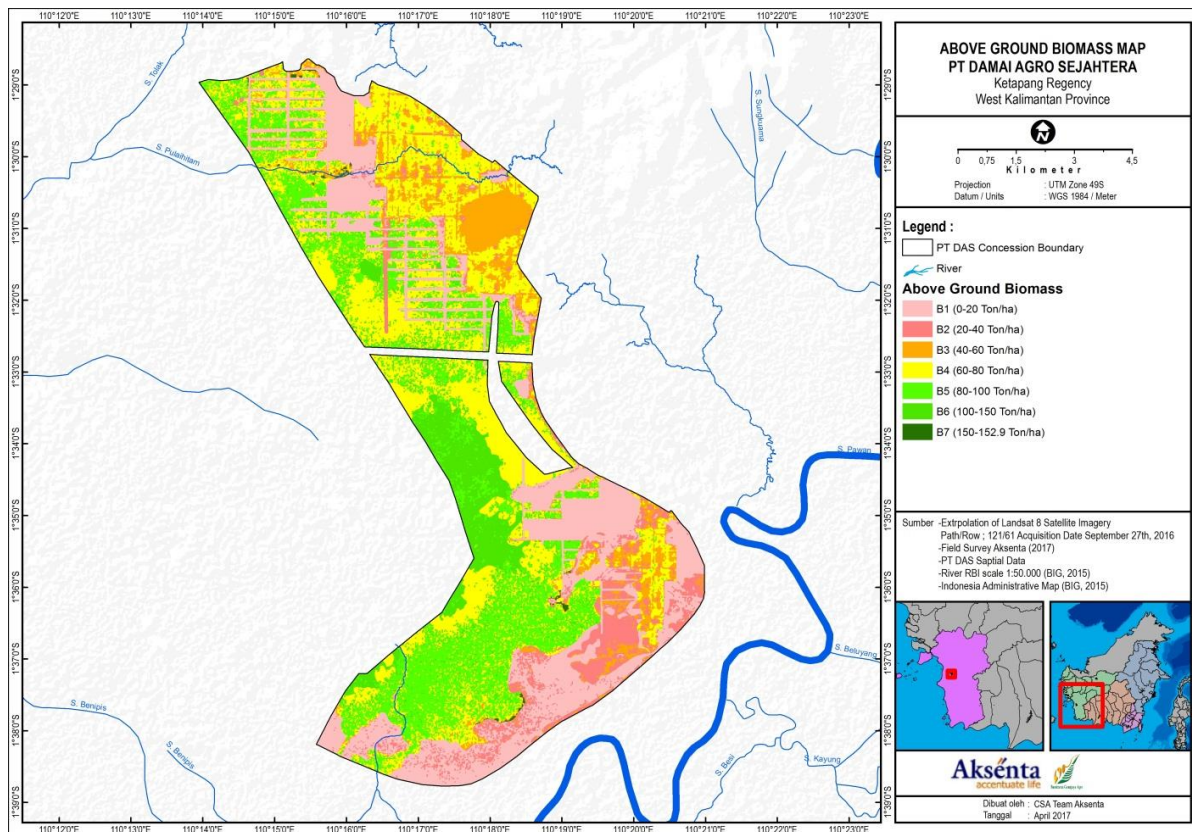


Chart 1: The proportions of land cover strata to the value of biomass class, PT DAS 2017

Table 40: The amount of AGB (kilo-ton) according to the division of AGB class in each stratum of land cover

Strata	Total Biomassa by AGB (kilo ton)							Total (kilo ton)	Area (ha)	Average (ton/ha)
	B1	B2	B3	B4	B5	B6	B7			
HS	-	-	2.8	12.4	22.7	58.5	3.3	99.7	1022.1	97.5
BL	-	1.4	85.2	49.9	138.8	17.9	-	293.2	3884.5	75.5
SB	1.0	11.8	3.2	-	-	-	-	16.0	491.8	32.5
SM	6.9	6.9	6.9	6.9	6.9	-	-	34.5	2318.9	14.9
KS2004	-	-	-	10.8	33.7	-	-	44.5	521.0	85.4
KS2005	-	-	16.8	20.1	-	-	-	36.9	626.9	58.8
KS2006	0.02	0.6	14.8	18.2	-	-	-	33.6	579.4	58.0
Total	7.9	20.7	129.7	118.2	202.1	76.4	3.3	558.4	9444.6	59.1

Source: Data from Field Survey Analysis



Map 23: Distribution of Above Ground Biomass, PT DAS 2017

Carbon reserves originating from AGB are calculated based on the results of the mapping of biomass (tons / ha) with Carbon Fraction (CF) of 0.47. In this study, the biomass data used is the result of extrapolation for the entire PT DAS area. In order to facilitate the discussion and mapping of total biomass carbon stocks, in this study the total biomass carbon stock is grouped into four:

- BC1 : Carbon Stock AGB <20 ton-C/ha
- BC2 : Carbon Stock AGB 20-40 ton-C/ha
- BC3 : Carbon Stock AGB 40-60 ton-C/ha
- BC4 : Carbon Stock AGB 60-71.9 ton-C/ha

The amount of biomass carbon reserves in PT DAS area originating from the AGB in 2017 is around 251.2 kilo tons-C. Based on the results of the analysis, there are no areas with AGB carbon stock values above 80 tons-C/ha. The highest average carbon stock is owned by the HS strata, which is 45.8 tons-C / ha. The average of AGB oil palm reserves in 2004 was 40.1 ton-C / ha, this value is greater than the average AGB carbon stock of shrub cover, this shows that oil palm aged 13 years can replace shrub cover as a store of carbon stock .

The BC4 class indicated as the area with the highest carbon stock has only an average AGB carbon stock of 67.6 ton-C / ha. Carbon reserves in the PT DAS area are dominated by areas with carbon reserves in the BC class. The average AGB carbon reserve for the entire total area in the PT DAS area is 26.6 Ton-C / ha.

Table 41: Above Ground Biomass carbon stocks based on land cover classes at PT DAS, 2017

Strata	Karbon Biomassa Atas Permukaan (Kilo Ton-C)				Total	Luas (Ha)	Rata-rata (Ton-C/ha)
	BC1	BC2	BC3	BC4			
HS	0.1	9.0	34.9	2.9	46.9	1022.1	45.9
BL	0.8	76.8	60.2	-	137.8	3884.5	35.5
SB	6.4	1.3	-	-	7.7	491.8	15.6
SM	4.8	-	-	-	4.8	2318.9	2.1
KS2004	-	5.1	15.8	-	20.9	521.0	40.1
KS2005	0.3	17.1	-	-	17.3	626.9	27.6
KS2006	0.5	15.3	-	-	15.8	579.4	27.3
Total (Kilo Ton-C)	12.8	124.6	110.9	2.9	251.2	9444.6	26.6
Luas (Ha)	2852.3	4122.7	2426.6	42.9	9444.6		
Rata-rata karbon (Ton-C/ha)	4.5	30.2	45.7	67.6	26.6		

Table 42: The area according to the classification of AGB carbon stocks for each strata of land cover at PT DAS, 2017

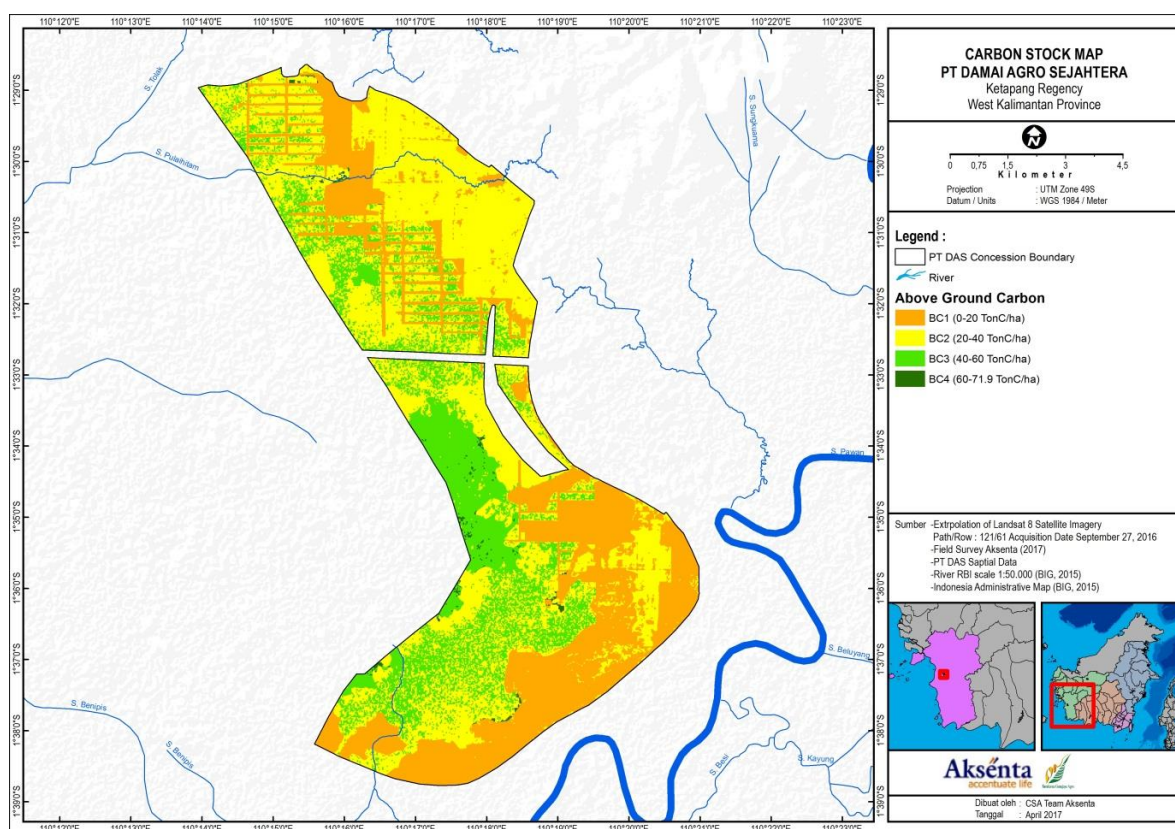
Strata	Luas Karbon Biomassa Atas Permukaan (Kilo Ton-C)				Total
	BC1	BC2	BC3	BC4	
HS	4.7	275.2	699.3	42.9	1022.1
BL	51.0	2464.7	1368.8	-	3884.5
SB	436.1	55.7	-	-	491.8
SM	2318.9	-	-	-	2318.9
KS2004	-	162.4	358.5	-	521.0
KS2005	14.1	612.8	-	-	626.9
KS2006	27.5	551.9	-	-	579.4
Total (Ha)	2852.3	4122.7	2426.6	42.9	9444.6
Total (%)	30.2	43.7	25.7	0.5	100.0

Total Carbon Stock from all of carbon source on the area of PT DAS is 30,980.8 kilo ton-C with average per unit area 3,280.3 ton-C/ha. Peat lands become the largest source of carbon stock. It shows by very high soil carbon reserves, 30,636.6 kilo ton-C.

Table 43: Total Carbon Stock Recapitulation at PT DAS (2017)

Sumber Karbon	Cadangan karbon total (Kilo Ton-C)				Total	Rata-rata (Ton-C/ha)
	BC1	BC2	BC3	BC4		
Above Ground Biomass	12.8	124.6	110.9	2.9	251.2	26.6
Below Ground Biomass	4.7	46.1	41.0	1.1	92.9	9.8
Karbon Tanah ;						
Tropaquepts; Tropofluvents; Fluvaquents	106.8	41.6	48.4	0.0	196.8	209.4
Tropohemist, Tropofibrists	2,602.2	7,017.0	4,249.0	78.9	13,947.1	3,890.4
Tropohemist, Troposaprist, Tropaquents	5,987.1	5,836.9	4,397.6	75.2	16,296.8	3,992.1

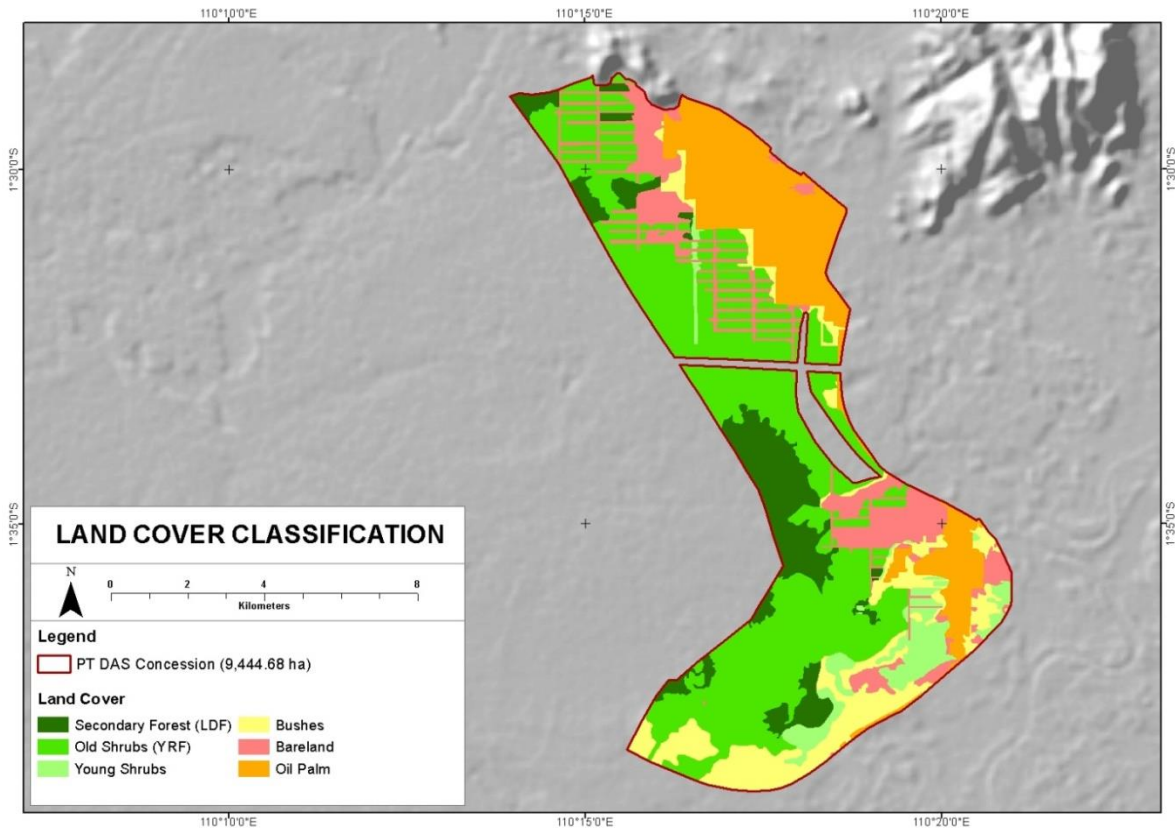
Tropodults; Paleodults	42.5	151.6	1.1	0.8	195.9	234.0
Total (Kilo Ton-C)	8,756.1	13,217.8	8,848.0	158.9	30,980.8	3,280.3
Luas Area (Ha)	4,538.3	2,795.3	2,068.2	42.9	9,444.6	



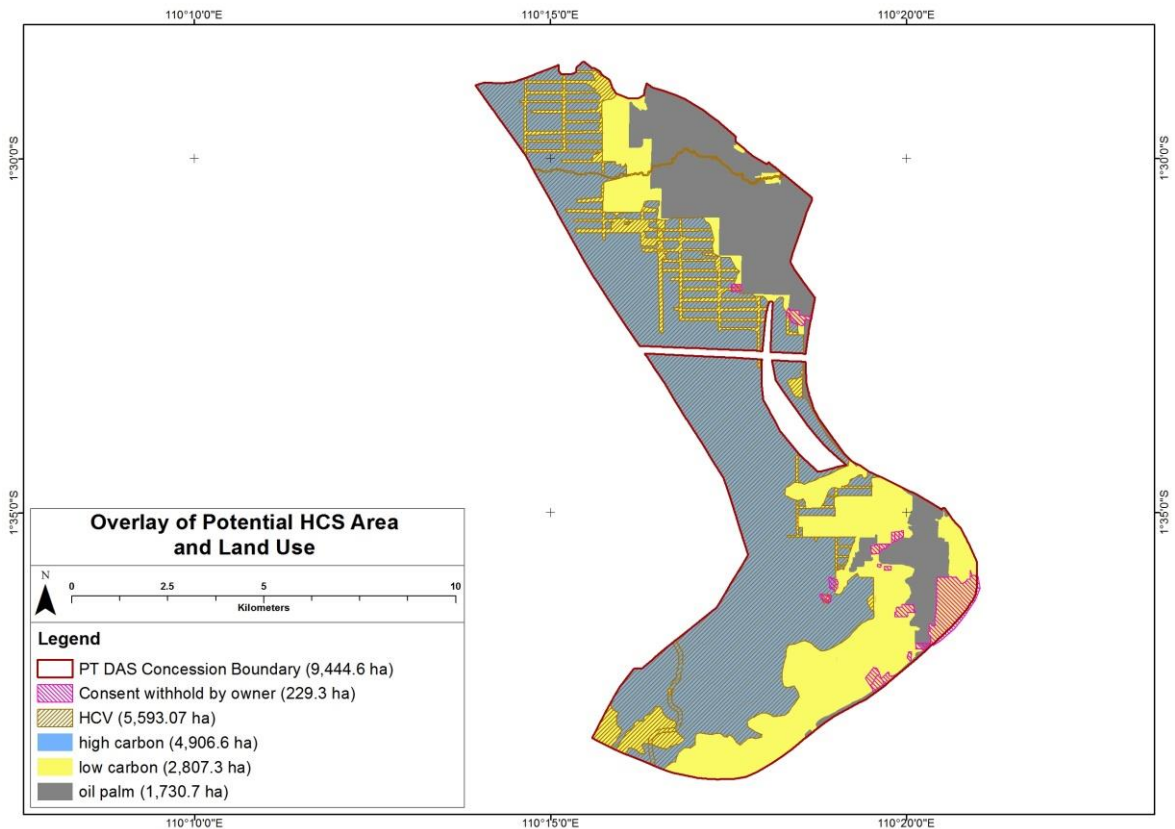
Map 24: Carbon Stock Distribution (AGB) at PT DAS

Tabel 44: Summary of carbon stock analysis by land cover class

Land cover class	Number of Plots	Stems per hectare	Basal Area (m ² /ha)	Average Carbon Stocks	Standard error of the mean	Confidence limits (90%)	
						Lower	Upper
Young Shrubs (Semak Belukar)	3	1,696	229.8	12.9	1.0	11.9	13.8
Young Regenerating Forest/Old Shrubs (Belukar)	36	1,771	2,643.6	34.1	7.0	32.2	35.9
Low Density Forest/Secondary Forest (Hutan Sekunder)	18	2,076	1,919.4	49.4	11.3	45.0	53.7



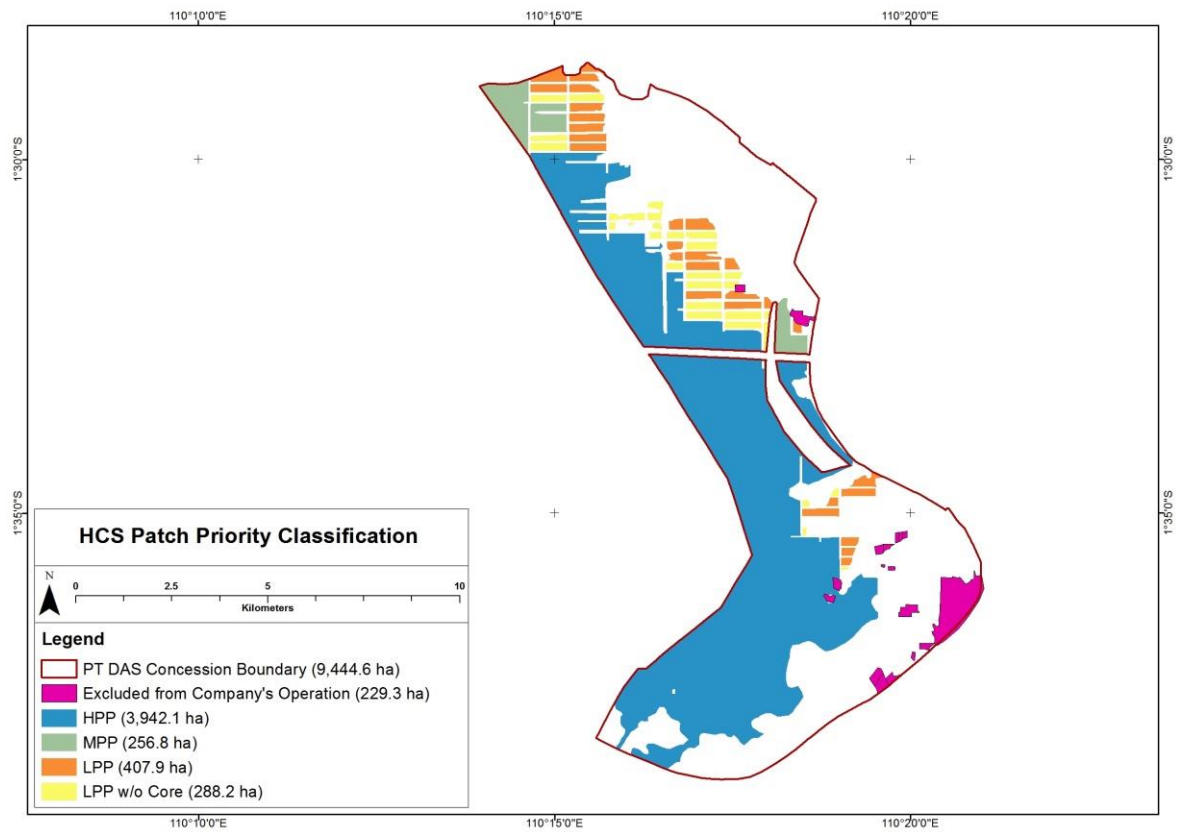
Map 25: Final land cover class classification in the PT DAS Concession



Map 26: Overlay of potential HCS area and land use

Most of the potential HCS areas in the study area are integrated with the expanse of peat swamp forest located to the west of the study area, while others are HCS patches separated by blocking. Large HCS patches are categorized as high priority patches because they have a core area of >100 ha, while HCS patches separated by blocking are classified as medium and low priority patches because they have a core area of 10-100 ha and <10 ha.

There are 61 HCS patches in the study area consisting of 2 high priority patches, 3 medium priority patches, 29 low priority patches, and 27 low priority patches without core areas. The total area of HCS patches in the study area is 4,895 ha.



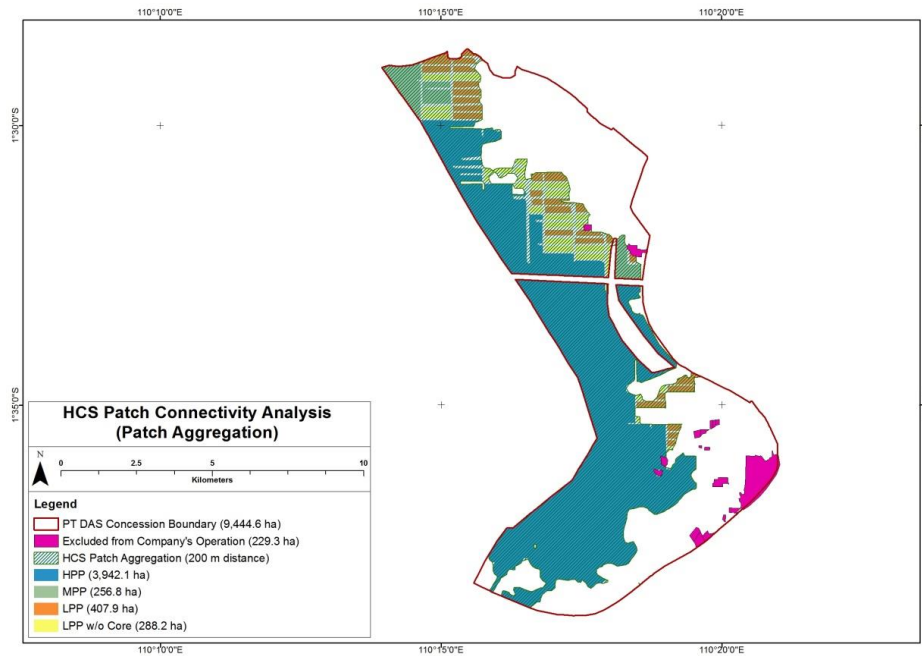
Map 27: HCS Patch Priority Classification

Connectivity analysis between patches shows that patches separated by blocking are still included in the category of being connected to high priority HCS patches. Connectivity analysis was carried out with the criteria for the maximum distance between patches as far as 200 m. Patches that are separated by a maximum distance of up to 200 m are categorized as connected, whereas if they are more than 200 m apart, they are not categorized as connected.

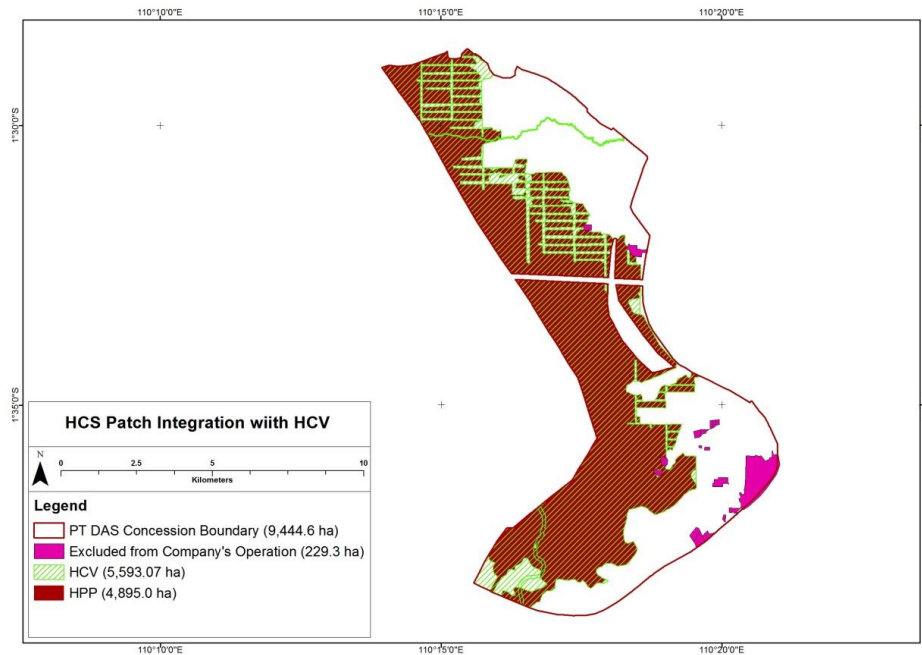
Patches previously identified as medium and low priority based on their core area, have a relationship with the high priority patch. Some of these patches are connected directly to the high priority patch, while others are connected to the medium or low priority patches that are connected to the high priority patch. Therefore, all HCS patches in the study area are classified as high priority patches. In addition, all HCS patches in the study area also overlap with the HCV areas in the study area.

In the patch adjustment phase, all areas with non-HCS land cover that are enclosed between HCS patches are designated as conservation area enhancements. This designation is also consistent with

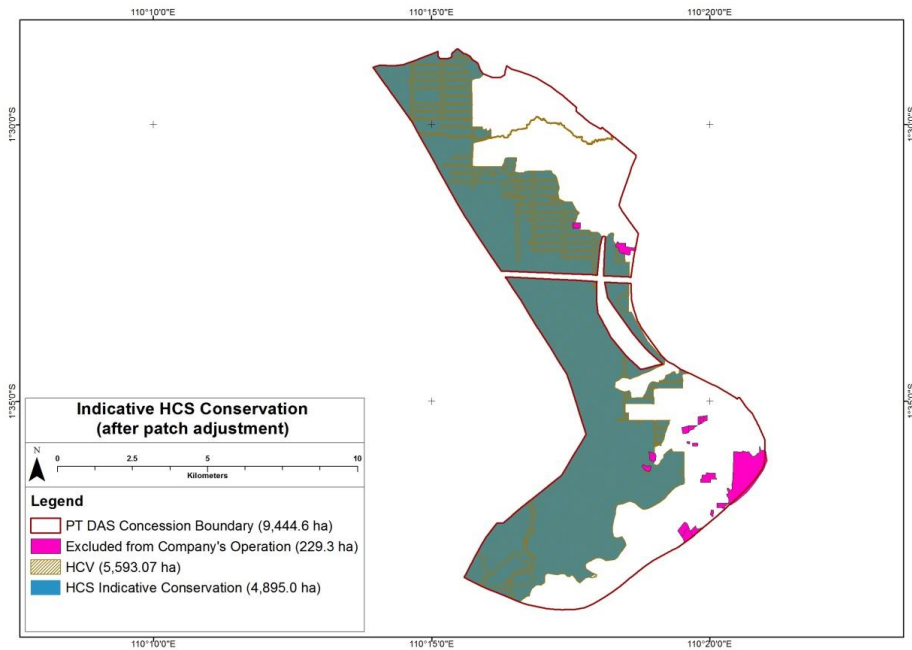
supporting the results of the HCV assessment because these areas also overlap with the HCV areas in the study area. The area of the non-HCS area designated for enrichment of the HCS conservation area is 682.2 ha. The area consists of a block road between the HCS patches and an area to the south of the study area that is enclosed by a high priority HCS patch.



Map 28: HCV Patch Connectivity Analysis

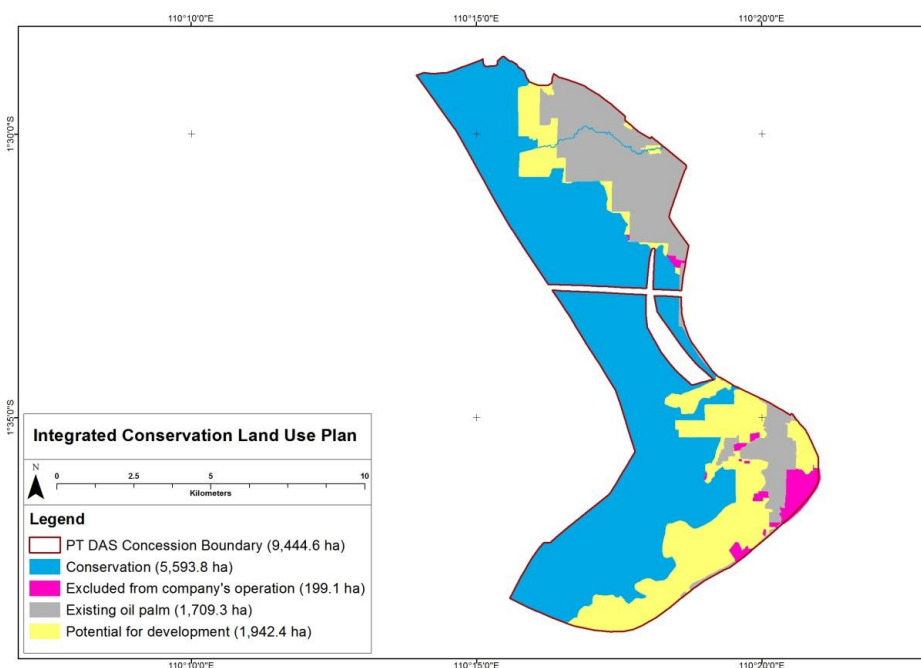


Map 29: HCS Patch Integration with HCV



Map 30: Indicative HCS Conservation (after patch adjustment)

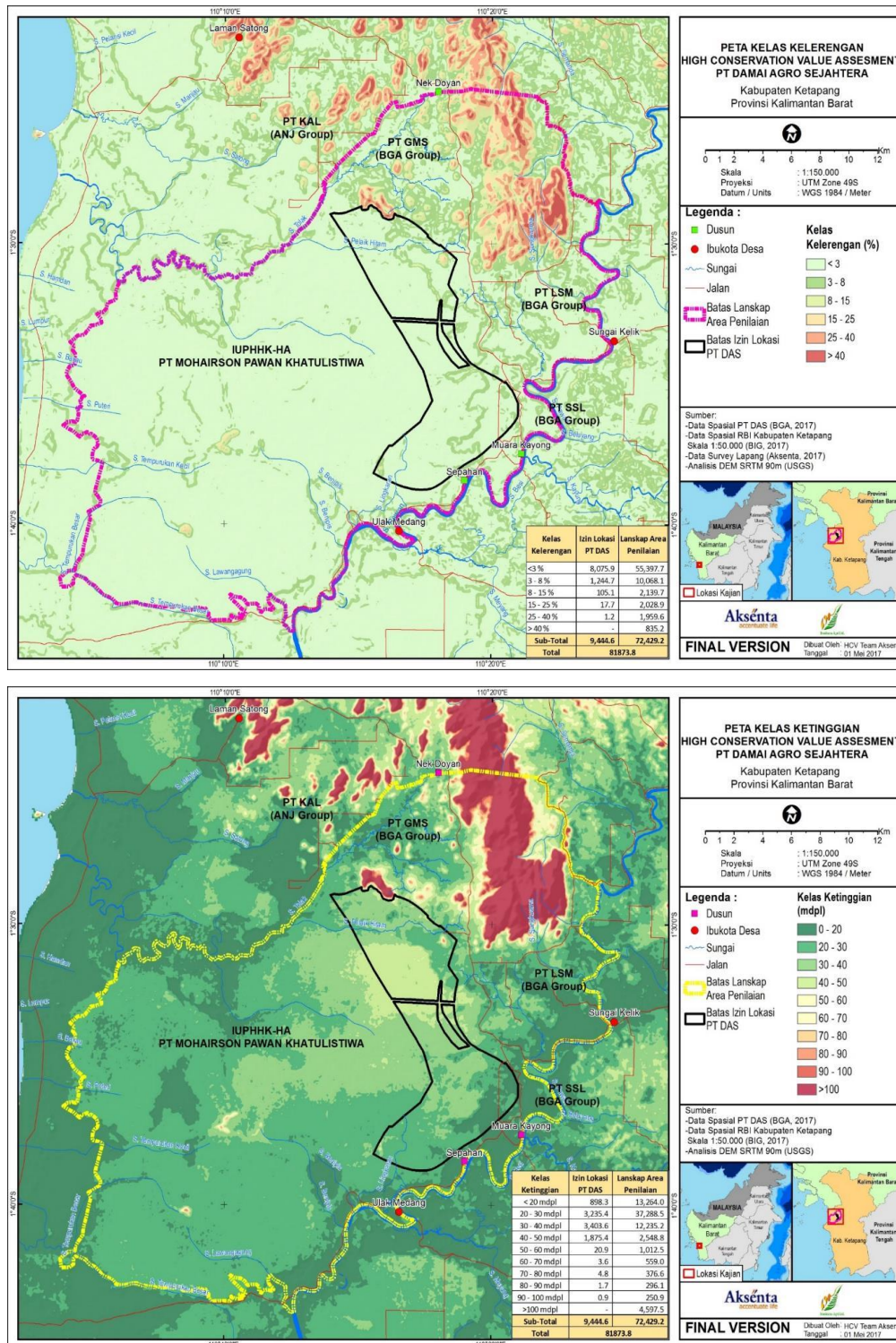
The area of the HCS indicative conservation area in the study area is 5,577.2 ha. The area consists of a high priority HCS patch covering an area of 4,895.0 ha and an enriched HCS conservation area of 682.2 ha. The entire area overlaps with the HCV area. The HCV area in the study area is 5,593.1 ha, however, there is a portion of the HCV area located on community-owned land that is excluded from the company's operations covering an area of 15.9 ha. To apply the precautionary principle, the HCS and HCV conservation areas are categorized as an indicative conservation land use in the study area. Total area of indicative conservation area in the study area.



Map 31: Indicative Integrated Conservation Land Use Plan

3.5 Soil & Topography

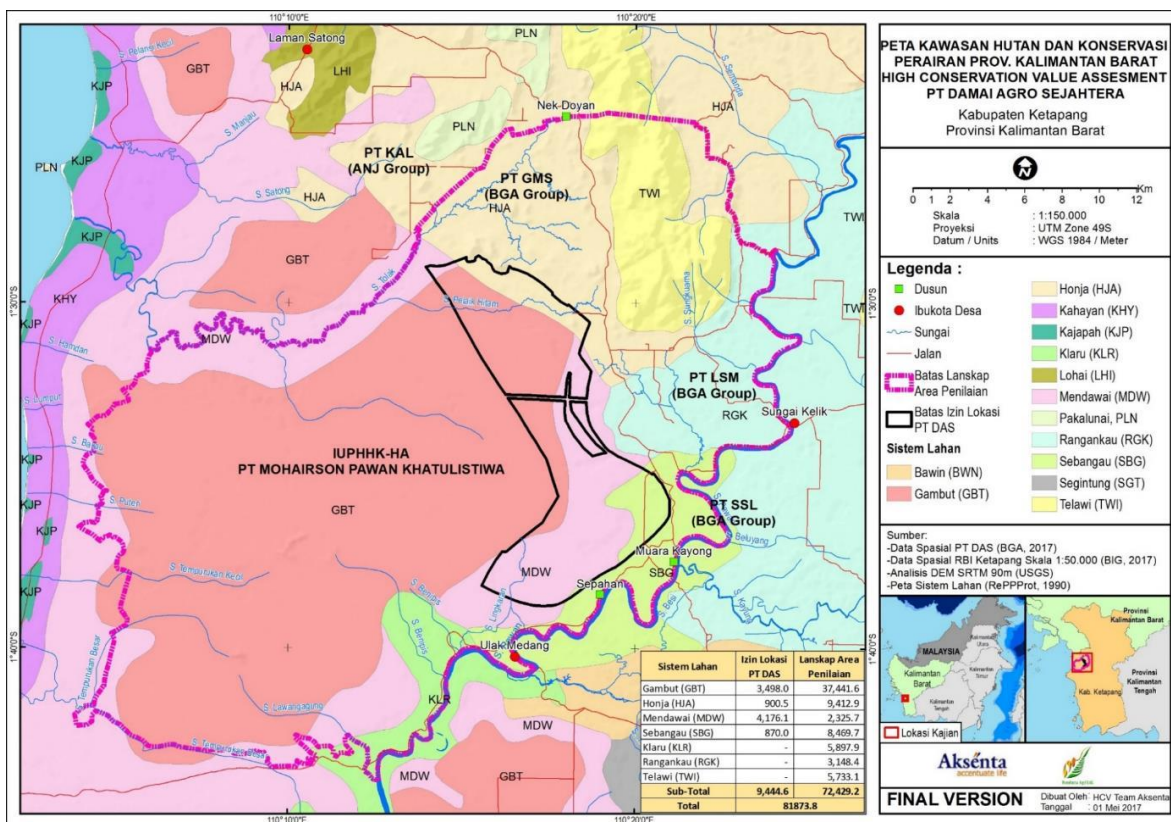
In general, the land topography is classified as very flat (slopes less than 3%) with elevations range between 30-50 m above sea level. The land elevation of mineral soil is relatively higher than the peat soil. The majority area were covered by freshwater topogen peat (tropohemist, tropofibrst, troposaprist). The depth of peat varies, with the deepest reaches more than 5 m. The remaining area has mineral soils for instance order inceptisol with parent clay material comes from the rear swamp of the Pawan River meander and order oxisol comes from incised old volcanic hills.



Map 32: Elevation Map of PT DAS

Based on the map of land systems (RePPPProt, 1985), the area of PT DAS consist of 4 (three) land systems, namely: Mowing, Peat, Sebangau and Honja Whereas in the assessment landscape there are seven land systems, namely Peat (GBT) , Honja (HJA), Sebgau (SBG), Klaru (KLR), Telawi (TWI), Rangankau (RGK), and Mendawai (MDW).

The landform for the GBT, MDW, and KLR land systems is swampy areas. KLR is a swamp area of the Pawan River flood plain downstream with lithology in the form of alluvium riverine while GBT and MDW are peat swamp areas with varying depths (shallow to deep) with lithology composed of organic matter. SBG is the Pawan River meander belt; very flat topography; and lithology in the form of alluvium riverine. Landform types of HJA and RKU are plain (plain), for HJA are metamorphic plains with a rather hilly topography while RKU is a sedimentary plain with a slightly undulating-rolling topography. Landform type TWI is ridge systems around Bukit Tarak; lithology in the form of granite; and moderate-steep hilly topography.



Map 33: Land System in the area of PT DAS

Mapping on semi detailed soil types on a scale of 1: 50,000 provides information on soil types up to the level of subgroups. The results of the analysis and observations in the field show that there are 6 types of soil at the subgroup level. Typic Dystrudepts or Kambisol Subgroups are found in two SPTs, namely SPT-1 and SPT-4. The difference between the two lies in the landform. Whereas in SPT-2 there are two types of soil that are distinguished based on the parent material. Each type of land is mapped on a semi-detailed map scale (**Map 34** and **Table 45**).

Tabel 45: An Area based on its soil types in the area of PT DAS

Code	Soil Type	Area	
		(Ha)	(%)
1	Typic Dystrudepts	875,50	9,27
2	Typic Endoaquents	179,43	1,90
3	Typic Haplohemist	176,81	1,87
4	Typic Haploorthods	1074,06	11,37
5	Typic Haplosaprist	5510,62	58,35
6	Typic Quarzipsamments	1628,25	17,24
Total		9444,66	100

The following is an explanation of each type of soil and its classification.

Typic Dystrudepts. Included in the order of Inceptisols, in the PT DAS region, a Typic Dystrudepts subgroup was obtained. Suborder Udepts is characterized by soil having a bumpy humidity regime where the soil has never been dry for more than 90 days (cumulative), has a three-phase system, namely solid-liquid-gas when the soil temperature is above 5oC. Found in humid climates with even distribution of rainfall or sufficient rainfall in the summer. Temperature regimes are Isoperhpermic where the average annual soil temperature is 22 ° C or higher. Epipedon including Umbrik and Endopedon including Kambik where the description of this land shows the existence of weak clues as argillic or Spodic horizon, but there is no indication to enter in both horizons. The soil structure has been formed and shows the physical alteration process.

Ordo	Great group	Group	Sub Group	Equivalent in the national classification system
Inceptisol	udepts	Dystrudepts	Typic Dystrudepts	Kambisol District

Typic Quarzipsamments or the equivalent of Eutrik Regosol. Coarse-textured soil (sand, sandy loam), has A okrik horizon, umbrik or mystical, thickness > 25 cm. In the USDA soil taxonomy, Psamment is defined as Entisol which basically consists of unconsolidated sand deposits, often found in shifting sand dunes but also in very rough parent material areas that have experienced millions of years of weathering. Psamments usually have a very low water holding capacity because the sand in the ground is not stratified so that sand from various roughness is constantly mixed through the soil. Because most sand is highly silica-containing, Psamments are also very low in all important nutrients, especially phosphorus and are very acidic in all except very dry climates. Typic Quartzipsamments are found on the old alluvial sand beach shore landform on the ridge, which is elongated parallel. This soil has a sandy (quartz) texture and the reaction is slightly acidic to neutral (pH 6.10 pH6.70). The content of C-organic and nitrogen is very low and levels of P2 O5 and K2 O are very low. The exchange rates of Ca, Mg, K, and Na are very low. CEC is very low to low and base saturation is low to moderate.

Ordo	Great group	Group	Sub Group	Equivalent in the national classification system
Entisol	psamments	Quarzipsamments	Typic Quarzipsamments	Regosol Eutrik

Typic Haploorthods or its equivalent Podsol Ortik. Spodosol soil order which has a A-E-Bhs-C horizon arrangement, with varying thickness of the horizon, rough texture ie sand to sandy clay.

Characteristics of the Soil Spodosol are the presence of the albic characteristic horizon with a light gray to white color and the spodic horizon with a very dark brown to black color. The process of podsolization is characterized by the movement of C-organic and aluminum can be exchanged from the albic horizon to the spodic horizon. The movement of C-organic is indicated by the dissolved organic carbon content in the soil. Dissolved organic carbon is the most active carbon in the organic carbon cycle. The content of dissolved organic carbon is directly proportional to the C-organic content in the soil horizon. Spodic horizon (Bhs) is a horizon of organic material and aluminum stockpiling, especially Al in amorphous form. Soil chemical properties of Spodosols show very acidic soil reactions, Al saturation is very high. Soil cation exchange capacity is very low to low. Bases are interchangeable (K, Na, Ca and Mg) and base saturation is generally very low.

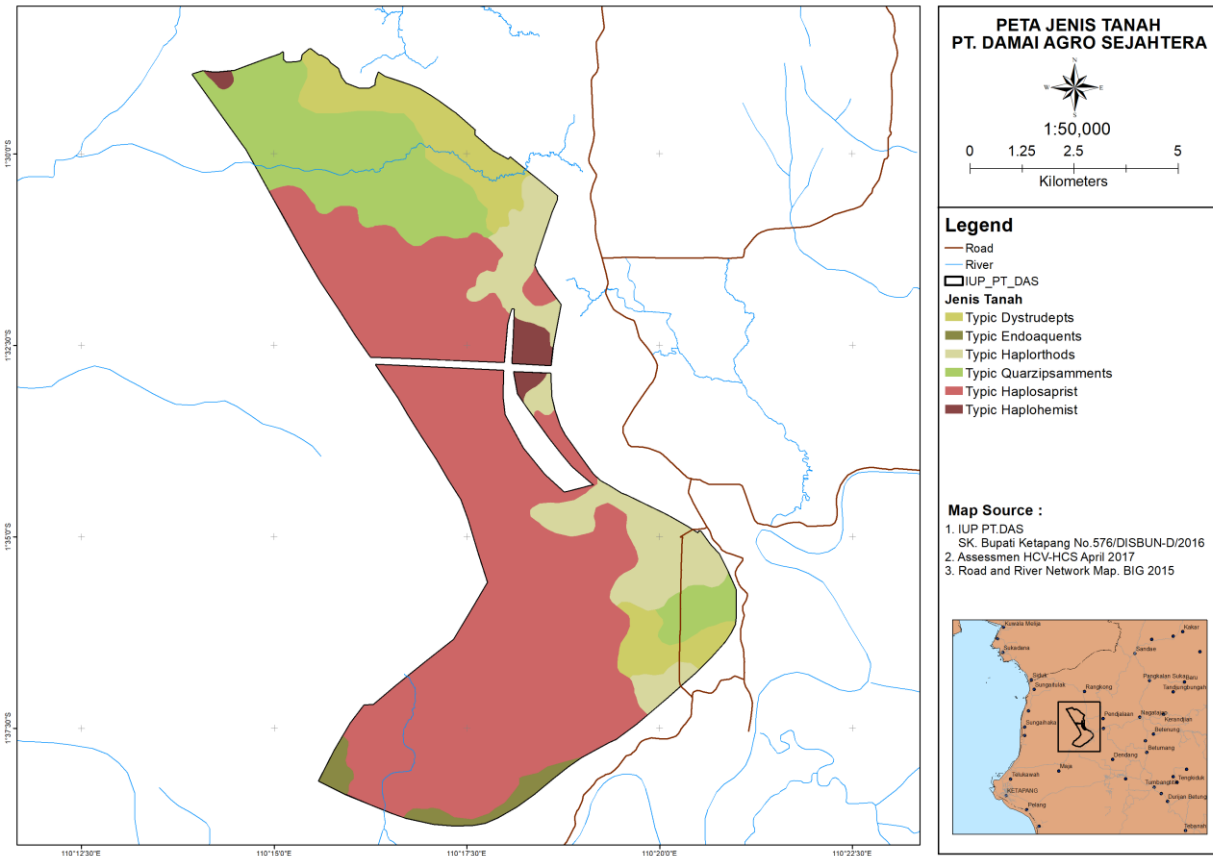
Ordo	Great group	Group	Sub Group	Equivalent in the national classification system
Spodosol	orthods	Haplorthods	Typic Haplorthods	Podsol Ortik

Typic Haplosaprist and Typic Haplohemist. The soil order is Histosol which means tissue. Histosol soil is formed from organic material that is the remnants of natural plant / vegetation tissue, at various levels of weathering / decomposition. The limits on organic soil material are as follows: (i) • Contains 18 percent or more C-organic (or > 31 percent organic material), if the mineral portion contains 60 percent or more clay fraction; or (ii) Contains 12 percent or more C-organic (or > 21 percent organic material), if the mineral portion does not contain a clay fraction (clay = 0 percent); or (iii) If the clay content is between 0-60 percent, then the C-organic content is between 12-18 percent. Because it is formed from organic matter, environmental conditions, and different times, the level of maturity of organic matter in histosol soils varies. Organic materials that have been cooked will tend to be finer and more fertile. Conversely immature, contains a lot of crude fiber and less fertile. Crude fiber is a part of organic material that does not pass the 100 mesh filter (100 holes / square inch).

Ordo	Great group	Group	Sub Group	Equivalent in the national classification system
Histosol	saprist	Haplosaprist	Typic Haplosaprist	Organosol saprik
	hemist	Haplohemist	Typic Haplohemist	Organosol hemik

Typic Endoaquents. Entisol soil is a land that has not yet shown the development of the horizon and occurs in young alluvial material. Soils that are equivalent to this type of soil are alluvial soils, regosols and low humus glei soils. This soil type is the youngest, usually comes from sedimentary sediment and is characterized by sand dominance. The color is predominantly gray and usually the layers are shallow and sometimes have met the rocks below. The advantages of this soil type physically are having good drainage and aeration. The weakness of this soil is poor organic matter and soil nutrients, especially nitrogen. Typic Endoaquents are Entisols classified as young soils, which are always saturated with water and the matrix is reduced to all horizons below a depth of 25 cm from the soil surface. This soil is also said to have an aquatic moisture regime, which is a reduction regime in soil that is completely free of dissolved oxygen because it is saturated with water.

Ordo	Great group	Group	Sub Group	Equivalent in the national classification system
Entisol	aquents	Endoaquents	Typic Endoaquents	Gleisol Distrik



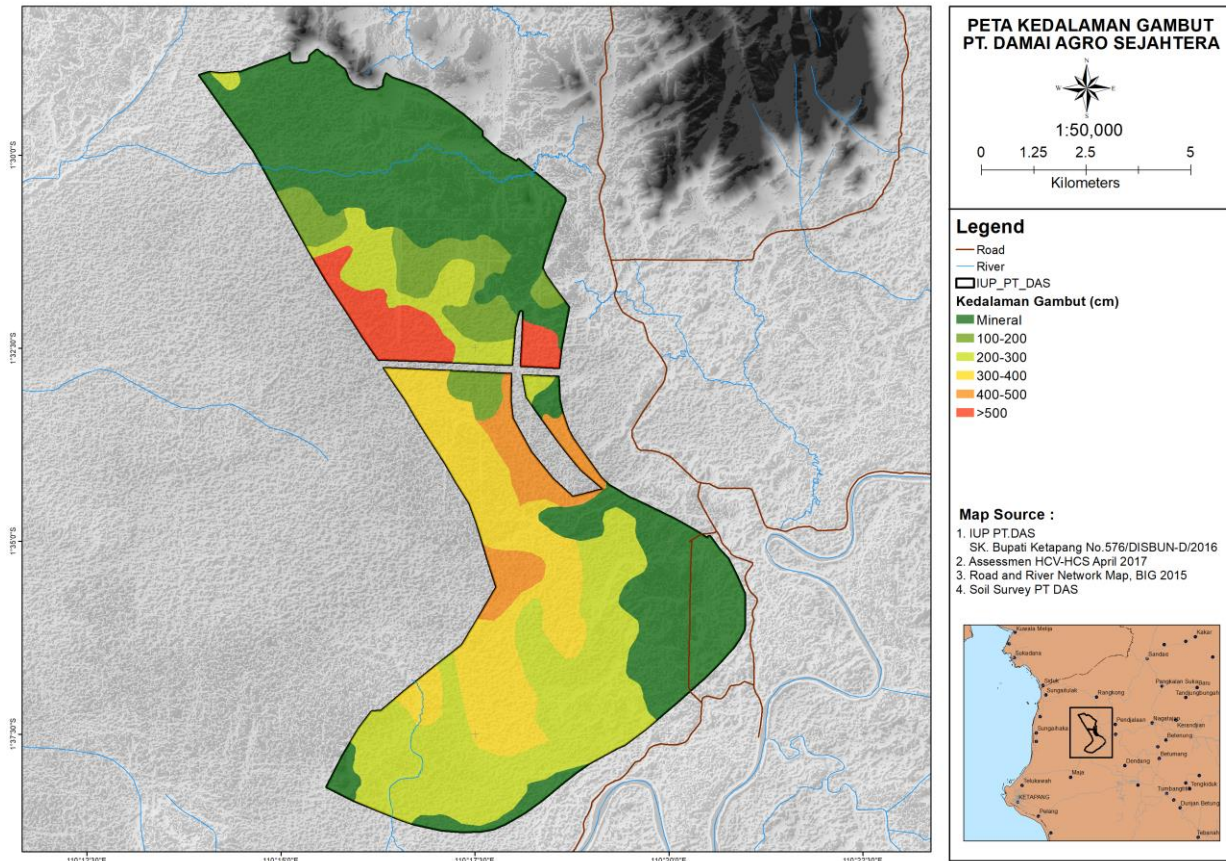
Map 34: Soil Map in the area of PT DAS, based on Soil Survey 2021

In addition to soil types mapping on March 2020, this activity also aims to determine the distribution of peatland thickness in the PT DAS concession area. The objective is as part of the initiation of activities to meet the management and restoration requirements of peatlands by KLHK. The transect model used to map peat depth is also the observation point of the KLHK.

The results of soil type classification indicate that peat soil in the PT DAS area consists of Typic haplohemist and Typic haplosaprist. Both types of peat are often found in association. However, there are several places that show a dominant type, as presented in Map 19. Both have varying thicknesses, so that the depth mapping of peat is not separated based on the type of peat in the subgrub level, but is mapped at the level of the Histosol order. The peat area in the PT DAS concession area is 5,687.4 ha (60.2%) consisting of shallow peat (50-300 cm) covering 3,287.7 ha (34.8%) and deep peat (> 300 cm) covering 2,399.7 ha (25.4%) (Map 31 and Table 42).

Table 46: Peat area according to thickness level (cm), in the area of PT DAS

No.	Soil type	Peat Depth (cm)	Relief	Area	
				Ha	%
1	Mineral	-	Datar (0-8%)	3,757.2	39.8
2	Organic/ Peat (saprist, hemist)	50 – 300	Datar (0-8%)	3,287.7	34.8
	Organic/ Peat (saprist, hemist)	> 300	Datar (0-8%)	2,399.7	25.4
Total				9,444.6	100.0



Map 35: Distribution of Peat Depth in the area of PT DAS

3.6 Green House Gasses

Greenhouse Gas emissions on the development plans area are calculated using the RSPO PalmGHG Calculator Version 3.0, as of January 2017.

The development and new planting for PT DAS will be based on the plantation permit (IUP), an area of 9,436 ha. Data used: spatial data map of permit boundaries, conservation area, land cover map, soil type's map and distribution of carbon stock map.

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 & shells usage, trend of management of POME.

- (i) 25 years of planting cycles

- (ii) Dosage of fertilisers
 - TSP 2 kg/year/plant from Egypt
 - MOP 2 kg/year/plant from Canada
 - Urea 1.5 kg/year/plant from Bontang, East Kalimantan
 - Kieserit 1.5 kg/ year/plant from Germany

- (iii) FFB per year: 25 tonnes (average of Bumitama)

- (iv) Processing
 - Extraction CPO 24% (average of Bumitama’s Mill)
 - Extraction Kernel 5 % (average of Bumitama’s Mill)
 - Extraction Shell 4 % (2% to be used and 2% for sale)

- (v) Conservation Area
 Conservation Area is determined by the company are 6640.67 ha, this include the HCV Area, HCS Area, KEE Area and Peat lands. There will be no land clearance in the Conservation Area.

Alternatives of land development:

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

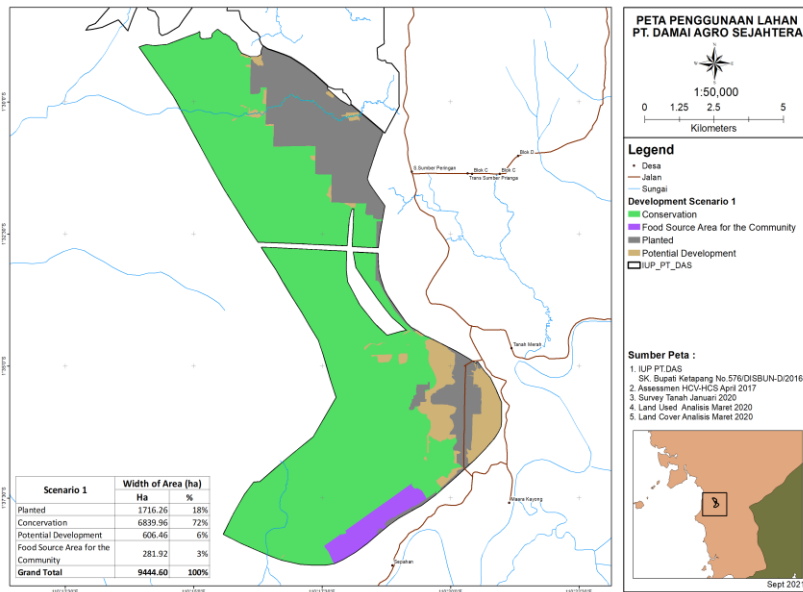
Table 47: Description of Development Scenarios

Scenario 1	<ul style="list-style-type: none"> • No land clearance on planned conservation areas in community land; • Land clearance of all mineral land in any land cover; • No Land Clearance on Peat Area; • No plan both for mill and methane capture facilities; • Total planting plan = 606.46 ha.
Scenario 2	<ul style="list-style-type: none"> • No land clearance on conservation areas in community land; • Land clearance of all mineral land in any land cover; • Planting plan on the ex-burn scar area, in any land cover class (367.57 ha); • No Land Clearance on Peat Area; • No plan both for mill and methane capture facilities; • Total planting plan = 974.03 ha.
Scenario 3	<ul style="list-style-type: none"> • No land clearance on conservation areas in community land; • Land clearance of all mineral land in any land cover; • Planting plan on the ex-burn scar area which have land cover bare land (52.91 ha); • No Land Clearance on Peat Area; • No plan both for mill and methane capture facilities; • Total planting plan = 659.37 ha.

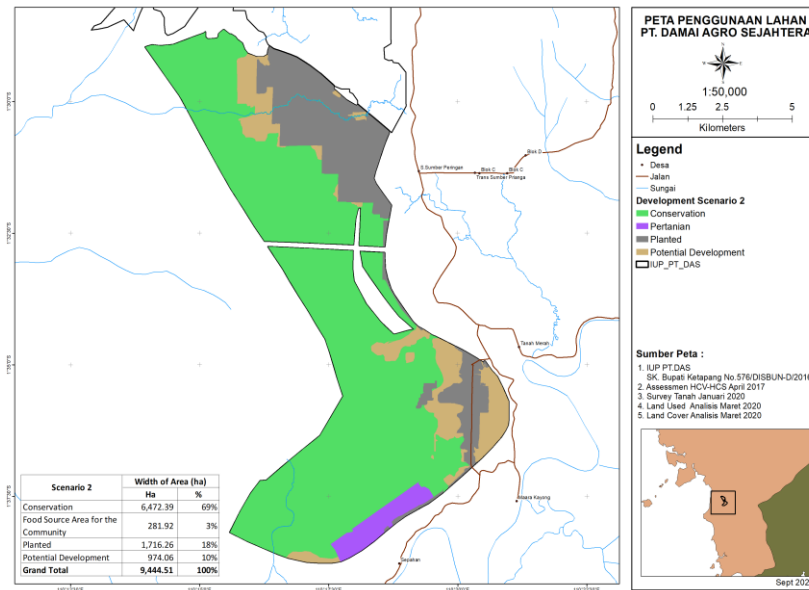
Table 48: Resume of Development Scenarios

Description			Area	Land Clearance Alternative		
			(ha)	1	2	3
A Planted Area (including infrastructure)			1,716.26	1,716.26	1,716.26	1,716.26
B Conservation			6,839.96	6,839.96	6,472.39	6,787.05
C Enclave (Food Source Area for the Community)			281.94	281.94	281.94	281.94
D Potential Development Area		tC/ha	606.44			
Belukar	286.46	34.10		286.46	307.65	286.46
Open Land	91.49	2.10		91.49	144.40	144.40
Semak Belukar	228.51	12.90		228.51	521.98	228.51
Total Development Area				606.44	974.03	659.37
Plan for methane capture				N	N	N
TOTAL Area (A+B+C)			9,444.60	9,444.60	9,444.60	9,444.60

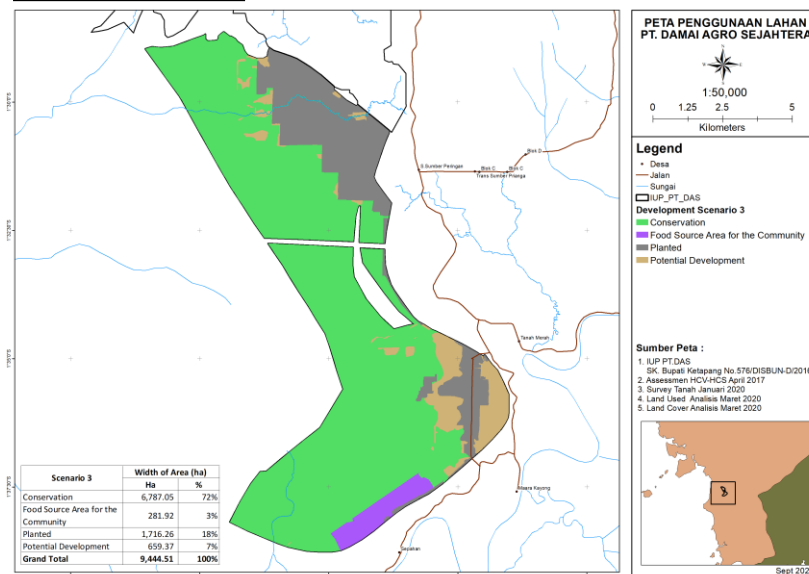
Scenario 1



Scenario 2



Scenario 3



Map 36: Scenarios on Development Plan of PT.DAS. All the Conservation Area are avoided to land clearance

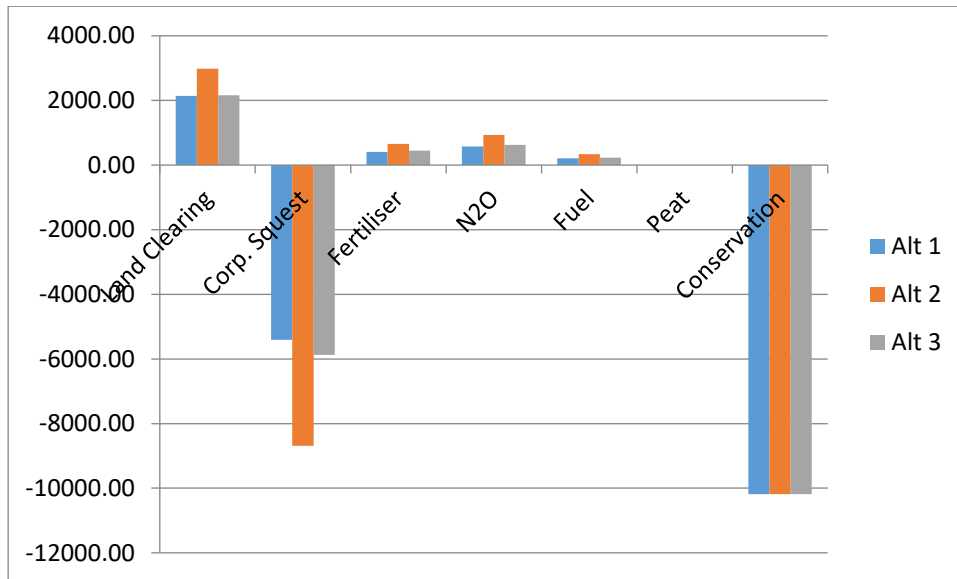
Table 49: Summary of GHG calculations based on land development alternatives

Alt.	Land Clearing	Corp. Squest	Fertiliser	N2O	Fuel	Peat	Conservation
Alt 1	2,144.64	-5,407.16	406.91	577.58	207.24	0.00	-10,179.55
Alt 2	2,982.63	-8,684.39	653.54	927.65	332.84	0.00	-10,179.55
Alt 3	2,161.75	-5,878.90	442.42	627.97	225.32	0.00	-10,179.55

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

Alt.	Total Field Emission tCO ₂ e	Net Emission	t CO ₂ e/ha	tCO ₂ e/t FFB
1	-12,250.34	-11,865.32	-20.54	-0.82
2	-13,967.28	-13,348.91	-14.39	-0.58
3	-12,601.00	-12,182.39	-19.40	-0.78

Chart 2: GHG Calculation based on land clearing alternatives

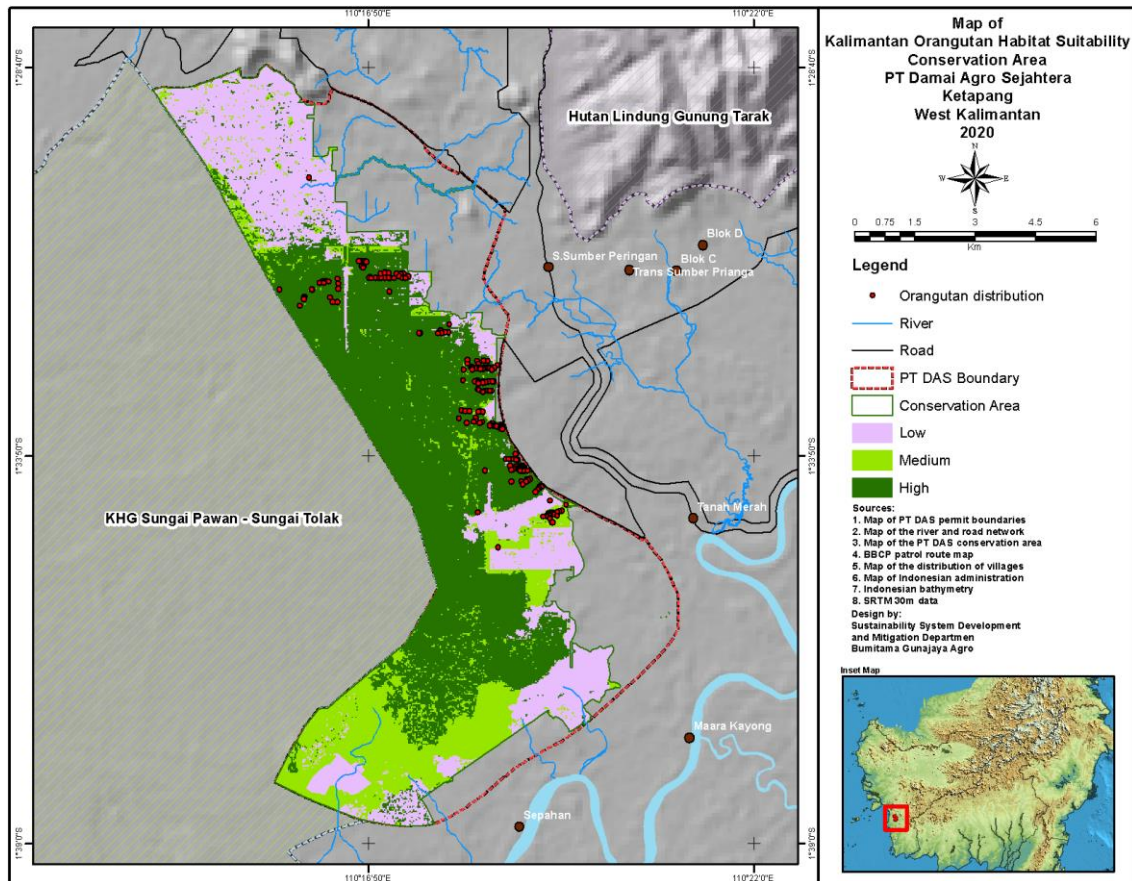


Based on the GHG calculation, PT DAS will follow land clearance in accordance with the first alternative, with total emission produced from estate (plantation) -11,865.32 tones CO₂e. While the emissions per ton of product (FFB) is -0.823 tons CO₂e, with -20.54 tones CO₂e/ha. This option fulfills the above stated criteria for land clearing and planting.

The details are following:

- No land clearance on planned conservation areas in community land;
- Land clearance of all mineral land in any land cover;
- No Land Clearance on Peat Area;
- No plan both for mill and methane capture facilities;
- Total planting plan = 606.46 ha.

The selection of scenario 1 has met the non-peat criteria based on the results of the peat soil survey, HCV-HCS delineation and orangutan distribution study.



Map 37: Suitability of Kalimantan Orangutan Habitat in The Conservation Area of PT Damai Agro Sejahtera

Study the distribution of orangutans, please refer to the following journals:

<http://ioppor.cpopc.org/ArticleView/view?id=ID28>

PT DAS has submitted its GHG Report for New Planting, which includes plans on how to mitigate its emission to the GHG Unit of RSPO Secretariat, it has been declared complete for GHG's section on June 18, 2020.

3.7 LUC Analysis

The natural resources in the study area that were utilized by the local community initially were timber forest products and non-timber forest products. Before 1945 local people had settled in hamlets around the PT DAS area. In 1980 transmigration from the islands of Java and West Kalimantan was brought by the government to the area around PT DAS (Transmigration Sumber Peringan). The Transmigration Community utilizes wood forest resources using Chainsaw.

In 1990 most of the PT DAS area was a concession area owned by PT Marsela which carried out logging activities. PT Marsela is carrying out logging activities with forest concessions. The existence of PAL 20 road is evidence of PT Marsela's presence in the study area. PT Marsela stopped logging operations in 1997 due to conflicts with the community. However, logging activities continued to be massive by the local community, especially in 1999-2004. Logging is carried out by communities in all areas that still have wood reserves, including in the Gunung Tarak Protection Forest area. The

Nanga Tayap and Matan Hilir Utara sub-districts were known as the largest timber producers in Ketapang Regency in 2000. Based on the chronology of the use of these forest resources, it was concluded that in the PT DAS area there were no primary forests; almost all forest areas are used by communities for logging activities. At present the condition of forests in the PT DAS area is in the form of degraded forest secondary forests.

The PT DAS area in 2004 was a concession area of PT Ketapang Mandiri in collaboration with PT GYP. Between 2004 - 2006, PT GYP conducted land clearing for planting oil palm. The total area planted with oil is around 1,382.36 ha. Land use by local communities is very limited within the PT DAS area because most of these areas are peat swamps and sandy soils. The ability of the community is still very limited to process peat swamps into agricultural / plantation land. Oil palm and rubber plantations owned by local communities are also found on sandy soil within the PT DAS area, but this is not optimal. In addition, the southern part of PT DAS often experiences fires during the dry season (in 2012, 2015 and 2016). The fire was allegedly caused by logging activities carried out by the community.

In 2016, PT DAS obtained a Location Permit based on Decree of the Regent of Ketapang District Number 27 / PEM / 2016 covering an area of 9,436 ha. After preparing the SEIA (ANDAL) document, PT DAS obtained an IUP based on the Decree of the Regent of Ketapang Number 576 / DISBUN-D / 2016. After the licensing process was completed, PT DAS carried out operational activities in the form of land clearing in October-November 2016. In December 2016, PT DAS was taken over by Bumitama Agri Ltd. and all operational activities are temporarily suspended.

Table 51: Historical Land Use Change in each cut-off date (in hectares), based on Permitted Location

Land Cover	Nov-05	Dec-07	Jan-10	May-14	Dec-16	Mar-17	Mar-20	Jul-21
Secondary Forest	7135.00	6671.00	6547.00	6488.50	4906.90	4906.90	4072.80	4072.80
Old Shrub	478.10	390.10	338.10	368.20	488.00	488.00	1103.10	1103.10
Shrub	530.60	252.30	485.70	500.10	1062.10	1062.10	1282.98	1282.98
Bare Land	1300.90	524.30	457.00	434.20	1256.90	1256.89	1224.42	1224.42
Palm Oil		1606.80	1616.80	1653.60	1730.70	1730.70	1761.30	1761.30
TOTAL	9444.60	9444.50	9444.60	9444.60	9444.60	9444.60	9444.60	9444.60

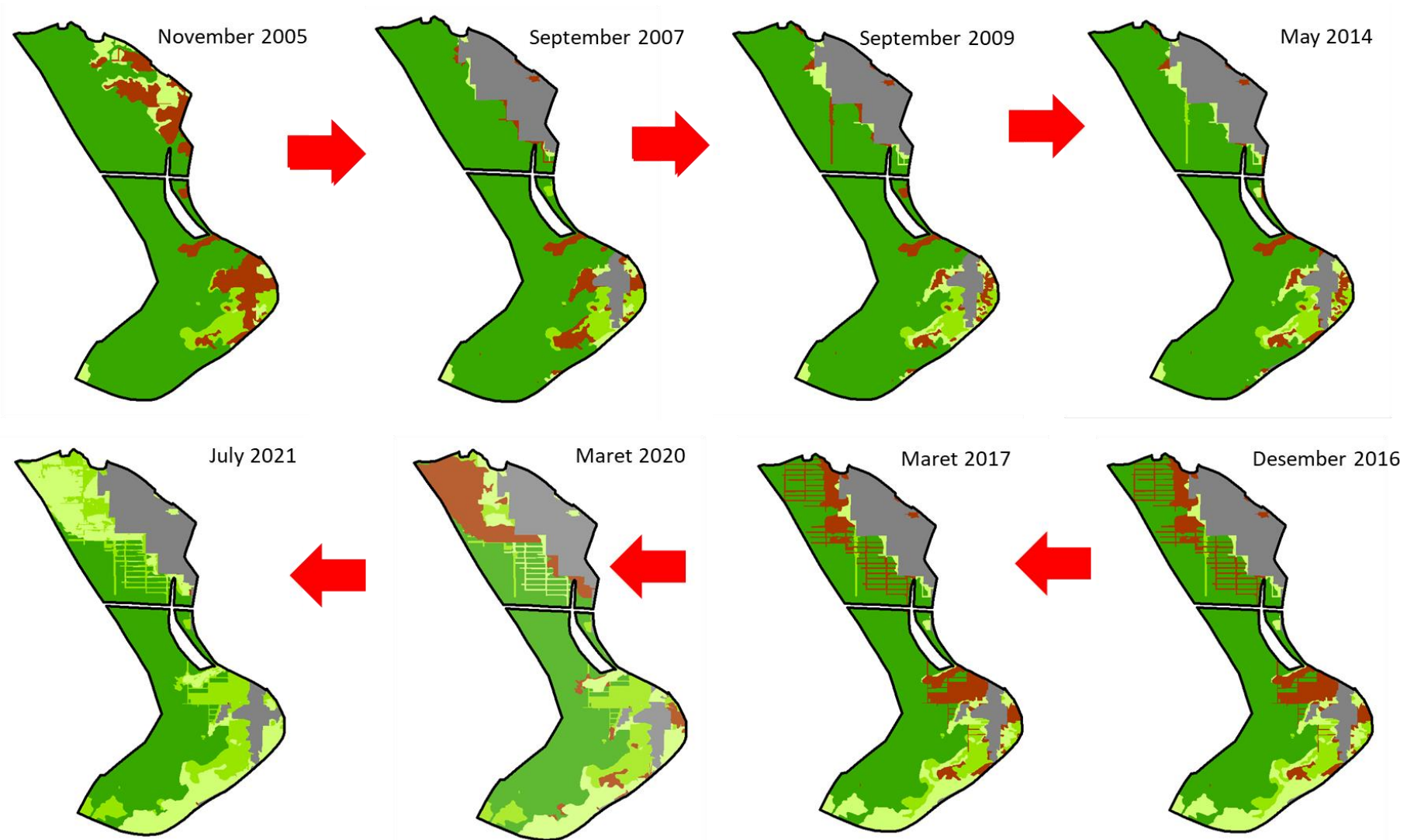
Table 52: Raw land covers data per period on the potential development area

Period November 2005 - November 2007- in hectares							
Corporate							
	Land cover class	November 2007					Total, Nov 05
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
November 2005	Hutan Sekunder	-	-	21.10	45.50	342.70	409.30
	Semak Belukar	-	-	-	2.80	4.10	6.90
	Semak	-	-	-	15.30	377.60	392.90
	Lahan Terbuka	-	-	-	-	882.40	882.40
	Total, Nov 07	-	-	21.10	63.60	1,606.80	1,691.50
Non-Corporate							
	Land cover class	November 2007					Total, Nov 05
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
November 2005	Hutan Sekunder	6,671.00	-	19.00	35.70	-	6,725.70
	Semak Belukar	-	355.10	-	116.10	-	471.20
	Semak	-	-	130.20	7.50	-	137.70
	Lahan Terbuka	-	35.00	82.10	301.40	-	418.50
	Total, Nov 07	6,671.00	390.10	231.30	460.70	-	7,753.10
Period December 2007-December 2009- in hectares							
Corporate							
	Land cover class	December 2009					Total, Dec 07
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
December 2007	Hutan Sekunder	-	-	50.70	65.20	-	115.90
	Semak Belukar	-	-	-	9.10	-	9.10
	Semak	-	-	-	12.20	0.50	12.70
	Lahan Terbuka	-	-	-	-	9.50	9.50
	Kelapa Sawit	-	-	-	-	-	-
	Total, Dec 09	-	-	50.70	86.50	10.00	147.20
Non-Corporate							
	Land cover class	December 2009					Total, Dec 07
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
December 2007	Hutan Sekunder	6,546.90	-	-	8.20	-	6,555.10
	Semak Belukar	-	338.20	2.40	40.40	-	381.00
	Semak	-	-	228.70	10.90	-	239.60
	Lahan Terbuka	-	-	203.80	311.00	-	514.80
	Kelapa Sawit	-	-	-	-	1,606.80	1,606.80
	Total, Dec 09	6,546.90	338.20	434.90	370.50	1,606.80	9,297.30
Period January 2010-May 2014- in hectares							
Corporate							
	Land cover class	May 2014					Total, Jan 10
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
January 2010	Hutan Sekunder	-	-	-	31.70	18.80	50.50
	Semak Belukar	-	-	-	-	-	-
	Semak	-	-	-	24.20	12.50	36.70
	Lahan Terbuka	-	-	-	-	5.50	5.50
	Kelapa Sawit	-	-	-	-	-	-
	Total, May 14	-	-	-	55.90	36.80	92.70
Non-Corporate							
	Land cover class	May 2014					Total, Jan 10
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	
January 2010	Hutan Sekunder	6,480.40	-	10.30	5.80	-	6,496.50
	Semak Belukar	-	326.60	11.50	-	-	338.10
	Semak	-	-	443.50	5.50	-	449.00
	Lahan Terbuka	-	41.60	42.80	367.10	-	451.50
	Kelapa Sawit	-	-	-	-	1,616.80	1,616.80
	Total, May 14	6,480.40	368.20	508.10	378.40	1,616.80	9,351.90

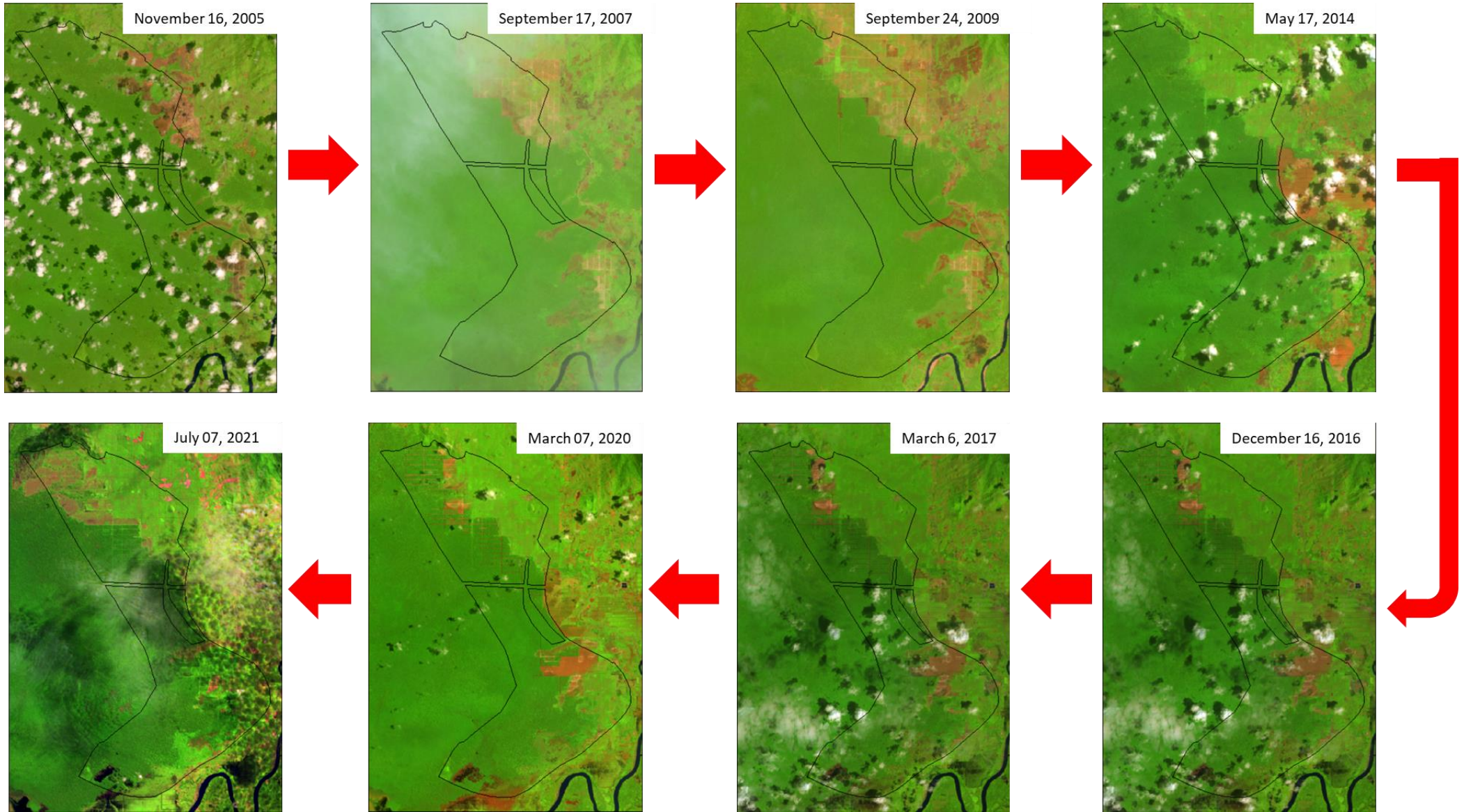
Period May 2014-After the management unit acquired (December 2016) - in hectares							
Corporate							
	Land cover class	December 2016					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, May 14
May 2014	Hutan Sekunder	-	-	5.10	881.60	-	886.70
	Semak Belukar	-	-	-	11.70	-	11.70
	Semak	-	-	-	39.90	-	39.90
	Lahan Terbuka	-	-	-	-	77.10	77.10
	Kelapa Sawit	-	-	-	-	-	-
	Total, Dec 16	-	-	5.10	933.20	77.10	1,015.40
Non-Corporate							
	Land cover class	December 2016					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, May 14
May 2014	Hutan Sekunder	4,906.90	125.10	569.80	-	-	5,601.80
	Semak Belukar	-	333.30	15.80	7.40	-	356.50
	Semak	-	29.60	413.80	16.80	-	460.20
	Lahan Terbuka	-	-	57.60	299.50	-	357.10
	Kelapa Sawit	-	-	-	-	1,653.60	1,653.60
	Total, Dec 16	4,906.90	488.00	1,057.00	323.70	1,653.60	8,429.20
Period December 2016-HCV assessment (March 2017)- in hectares							
Corporate							
	Land cover class	March 2017					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, Dec 16
December 2016	Hutan Sekunder	-	-	-	-	-	-
	Semak Belukar	-	-	-	-	-	-
	Semak	-	-	-	-	-	-
	Lahan Terbuka	-	-	-	-	-	-
	Kelapa Sawit	-	-	-	-	-	-
	Total, March 17	-	-	-	-	-	-
Non-Corporate							
	Land cover class	March 2017					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, Dec 16
December 2016	Hutan Sekunder	4,906.90	-	-	-	-	4,906.90
	Semak Belukar	-	488.00	-	-	-	488.00
	Semak	-	-	1,062.10	-	-	1,062.10
	Lahan Terbuka	-	-	-	1,256.90	-	1,256.90
	Kelapa Sawit	-	-	-	-	1,730.70	1,730.70
	Total, March 17	4,906.90	488.00	1,062.10	1,256.90	1,730.70	9,444.60
Period HCV Assessment - Latest Condition (March 2020)- in hectares							
Corporate							
	Land cover class	March 2020					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, March 17
March 2017	Hutan Sekunder	-	-	-	-	-	-
	Semak Belukar	-	-	-	-	-	-
	Semak	-	-	-	-	-	-
	Lahan Terbuka	-	-	-	-	-	-
	Kelapa Sawit	-	-	-	-	-	-
	Total, March 2020	-	-	-	-	-	-
Non-Corporate							
	Land cover class	March 2020					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, March 17
March 2017	Hutan Sekunder	4,073.3	56.2	16.5	760.6	-	4,906.6
	Semak Belukar	-	316.2	151.0	21.2	-	488.3
	Semak	-	356.2	612.7	93.1	-	1,062.0
	Lahan Terbuka	-	377.1	500.6	348.6	30.6	1,257.0
	Kelapa Sawit	-	-	-	-	1,730.7	1,730.7
	Total, March 2020	4,073.3	1,105.7	1,280.8	1,223.5	1,761.3	9,444.6

Period March 2020 - Latest Condition (Juli 2021)- in hectares

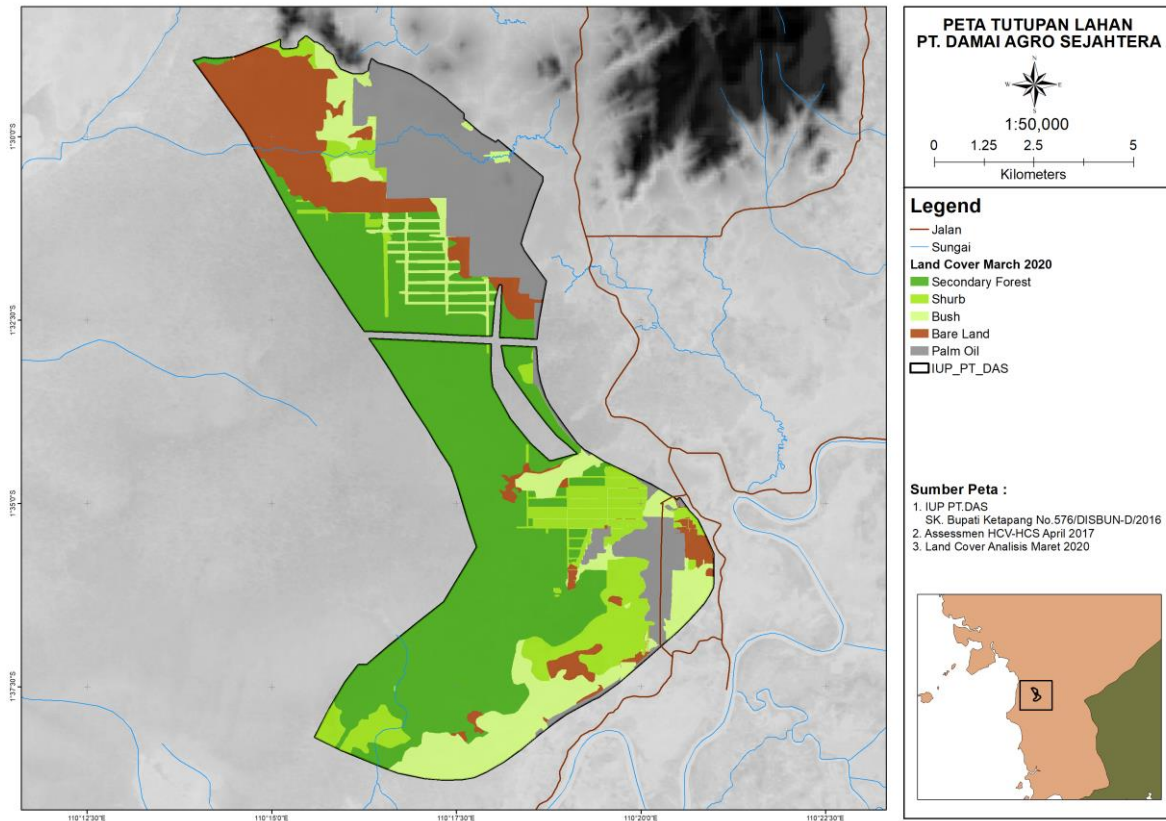
Corporate							
	Land cover class	Jul-21					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, March 20
Mar-20	Hutan Sekunder	-	-	-	-	-	-
	Semak Belukar	-	-	-	-	-	-
	Semak	-	-	-	-	-	-
	Lahan Terbuka	-	-	-	-	-	-
	Kelapa Sawit	-	-	-	-	-	-
	Total, July 2021	-	-	-	-	-	-
Non-Corporate							
	Land cover class	Jul-21					
		Hutan Sekunder	Semak Belukar	Semak	Lahan Terbuka	Kelapa Sawit	Total, March 20
Mar-20	Hutan Sekunder	4,072.8	-	-	-	-	4,072.8
	Semak Belukar	-	1,102.7	0.4	-	-	1,103.1
	Semak	-	325.1	957.7	0.2	-	1,283.0
	Lahan Terbuka	-	185.2	1,033.8	5.4	-	1,224.4
	Kelapa Sawit	-	-	-	-	1,761.3	1,761.3
	Total, July 2021	4,072.8	1,613.0	1,991.9	5.6	1,761.3	9,444.6



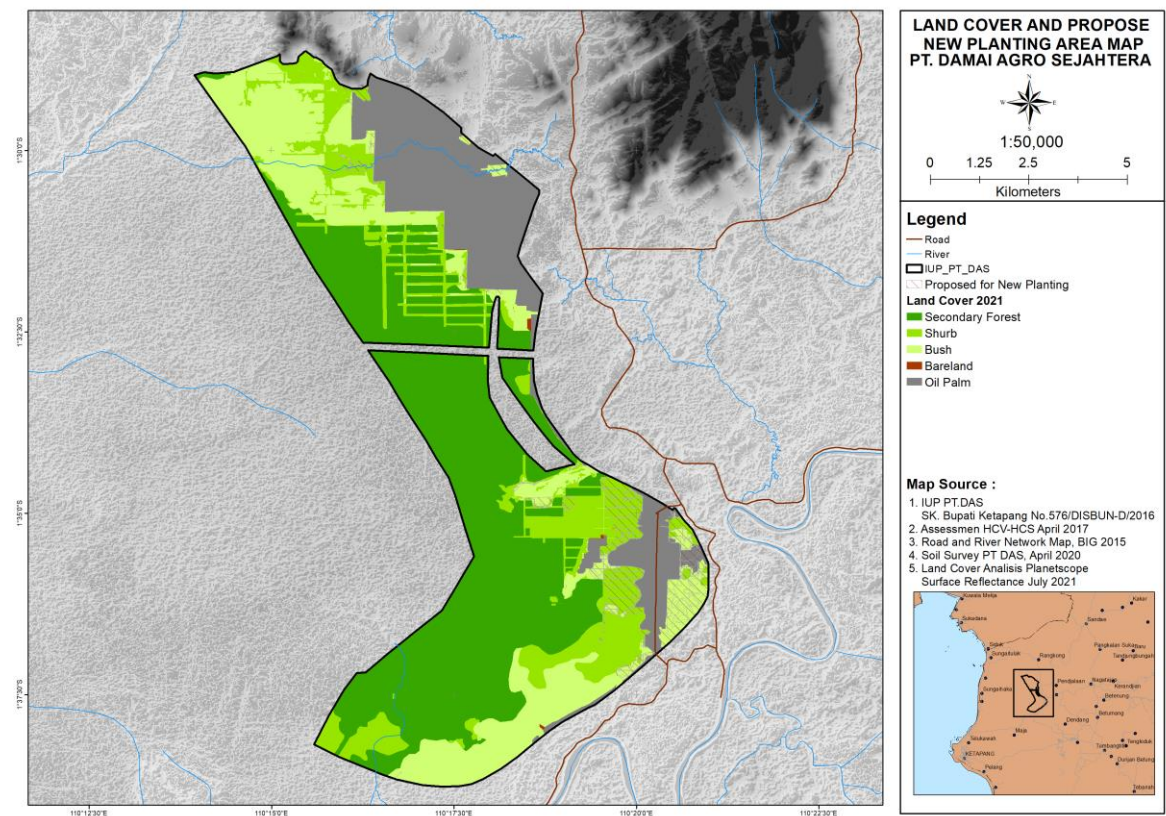
Map 38: Time Series LUC Analysis on the potential development area



Map 39: Time Series Satellite Image LUC Analysis on the potential development area



Map 40: Land Cover of PT DAS, March 2020



Map 41: Land Cover of PT DAS, July 2021

3.8 FPIC Process

PT DAS has started to conduct the socialization in April 2016, in a formal and informal way. Formal way is done through a meeting forum between the management of PT DAS and the government level at the district, sub-district and village levels, while informal socialization is done through visits to hamlets in two villages located in the study area by company public relations officers. Public Relation Officer is a local people who are recruited by the company from each hamlet whose area is located around the location permit area of PT DAS. First socialization is on 19 April 2016, then following with partnership socialization on 30 September 2016.

The socialization forum with the government was including the licensing that has been owned by the company either licensing business entity or licensing related to land legality. Other things that were presented are the plan of oil palm plantation development, partnership mechanism, land requirements and agreed on the value of land compensation on the community's land.

PT DAS also facilitates participatory mapping in an effort to agree on the village boundary of Laman Satong Village and Sungai Kelik Village, which was conducted on 1 August 2016, involving village officials and administrators of the Regional Development Board (BPD) witnessed by the Adat Council. The Company cooperates with the Satlak Desa Team to carry out community land disposal through identification processes, land measurement and verification, from which the spatial data obtained from community land in the form of maps.

The land mapping and compensation process is accompanied by an independent team called the Satlak Team. The Satlak team is an independent party appointed and agreed upon by the community as representatives of the community who ratify the measurement and mapping of land in the land compensation process. The team consists of village government and local community representatives.

Land acquisition by the company is carried out by paying compensation in the form of GRTT. GRTT was carried out in the period March-November 2016 by the old management of the company (before it was acquired by BGA), while in the period after that, the company has not continued the GRTT process and other operational activities. The total area that has been GRTT is 2,825.4 ha, consisting of 460.9 ha for the Dusun Muara Kayong area, 503.5 ha for the Dusun Nek Doyan area, and 1,861.1 ha for the Dusun Sepahan area.

4. Summary of Management Plans

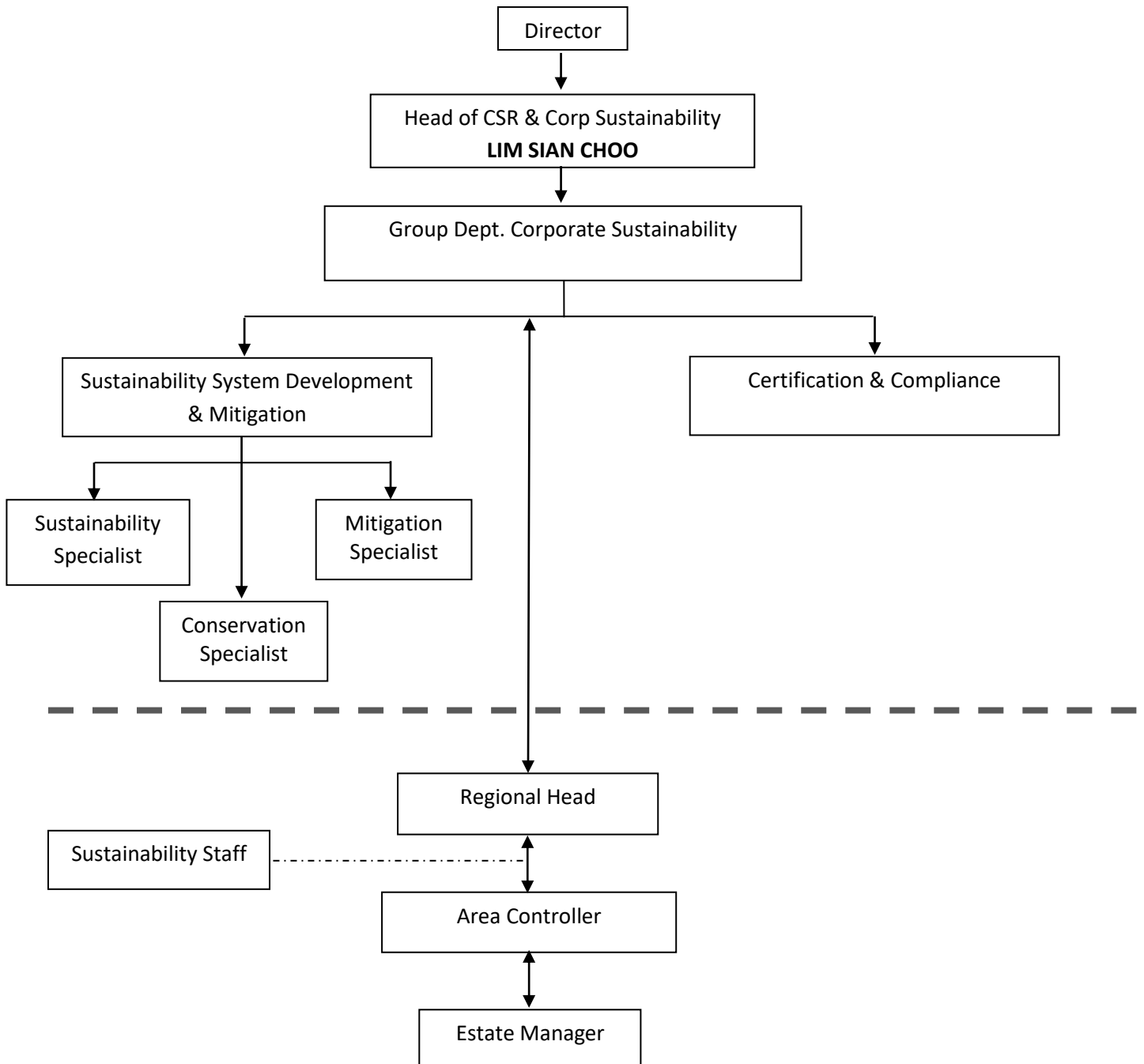
4.1 Team Responsible for Developing Management Plans

The process of HCV and SIA development and preparation of management and monitoring plans for PT DAS was implemented in phases involving several parties: Estate Department, the Public Affairs (PAD Department), Corporate Social Responsibility (CSR) Department, GIS Department and Sustainability Department. The whole process is in accordance with the plans facilitated by the Corporate Sustainability Department Head Office BGA Group. The details of the parties involved in the HCV and SIA development and preparation of management and monitoring plans are summarized in the following table.

Table 53: The Participatory List of developing management and monitoring plans for PT DAS

No.	Name	Department/ Expertise	Officeal Role
HCV-HCS Management & Monitoring Plan			
1	Jumadi	Regional Head	Participant
2	Irsan Hatunggal Harahap	Area Controller	Participant
3	Lim Sian Choo	Head of CSR & Corp. Sustainability	Participant
4	Hidayat Aprilianto	Head of Sustainability System Development & Mitigation	Participant
5	Muhammad Vikky Arindi	Mitigation Specialist	Facilitator
6	Putra Wibowo Malau	Conservation Specialist	Facilitator
7	Saeshaputi Rahmanita Prathiwi	Sustainability Specialist	Facilitator
SIA Management & Monitoring Plan			
1	Jumadi	Regional Head	Participant
2	Irsan Hatunggal Harahap	Area Controller	Participant
3	Gabriel Heru Prasetyo	CSR Specialist	Participant
Internal Review of the HCV & SIA Reports and implementation of Management & Monitotring (at head office)			
1	Lim Sian Choo	Head of CSR & Corp. Sustainability	Reviewer
2	Hidayat Aprilianto	Head of Sustainability System Development & Mitigation	Reviewer
3	Nandang Muyana	Head of Certification & Compliance	Reviewer

Management Team For Monitoring



4.2 Elements to Management & Monitoring Plans

4.2.1 Social Impact Assessment Management & Monitoring Plans

Stakeholders to be involved

The process of the SIA development and preparation of management plans and monitoring of PT DAS also involved relevant stakeholders such as local communities, the government of local village and Sub-District. It is aimed to provide opportunities for communication and sharing of information/opinion/suggestions between the PT DAS and stakeholders. Focus Group for Discussion consisted of people who were respondents (the workers, local communities and local government).

Table 54: Summary of Management and Mitigation Plans on Social Impact Assessment

Social Impact and Risk Aspects	Objectives	Action	Indicator	Expected Impact	Timeline
<ul style="list-style-type: none"> - Working at PT DAS as a source of livelihood for the community and the potential for increasing the absorption of local labor in the future. - Expectations are high to be accepted as an employee of PT DAS. 	<ul style="list-style-type: none"> - The need for labor in PT DAS can be a source of employment and income for the community according to their capacity. - PT DAS can obtain a competent workforce from the community. 	<ol style="list-style-type: none"> 1. Cadre the workers and create a clear career path system for workers. 2. Continue to recruit local people as employees in accordance with the operational needs of PT DAS. 3. Conducting outreach to the local community every time PT DAS opens labor recruitment. Socialization can be done formally or informally as well as verbally or through other media (for example: bulletin boards in hamlets). Recruitment information should also describe the required competencies of the candidate for work and other important information. 4. Maintain or improve the quality of the prospective workforce selection system. 5. If necessary, provide facilities for the community to be able to fulfill and / or increase their own capacity to match the workforce capacity needs required by PT DAS. 	<ol style="list-style-type: none"> 1. There is a staffing system that allows employees to increase their capacity and be accepted at a higher level according to the operational needs of PT DAS. 2. There were prospective workers / applicants from the local community when PT DAS opened the recruitment. 3. If PT DAS opens labor recruitment, then clear information about the recruitment opening must reach the community. Formal socialization (for example: through the hamlet head or hamlet information boards) must be available. Information should cover important aspects that a prospective employee/ applicant needs to fulfill. 4. A candidate selection system for workers is available and implemented. 5. If needed (for example: the community does not have the manpower capacity required by PT DAS in large numbers), then PT DAS can provide training or other means of capacity building (for example: education, counseling, etc.) to the community to fulfill that capacity. 	<ol style="list-style-type: none"> 1. The economic life of the community, especially workers in PT DAS, can become stable or increase according to work level and personal capacity. 2. Increased interest of the community to work at PT DAS according to their capacity. 3. Increased awareness of the community (especially young adults) regarding the need for certain competencies and / or capacities to be able to work at PT DAS. 4. PT DAS gets a qualified workforce from the community. 5. The availability of young people from communities who have sufficient capacity and competence to be able to work for PT DAS or other plantation companies in the area. 	<ol style="list-style-type: none"> 1. Evaluation of the system is carried out every 1 year. 2. Incidental and dependent on the opening of recruitment by PT DAS. 3. Incidental and dependent on the opening of recruitment by PT DAS. 4. Evaluation of the system is carried out every 1 year. 5. Incidental and dependent on the program implemented by PT DAS.
<ul style="list-style-type: none"> - CSR program and changes in community behavior (demanding). - High hopes of the community to get a CSR program in the form of instant / short-term assistance. 	<ul style="list-style-type: none"> - Producing CSR programs that can provide optimal and sustainable benefits. - The CSR program can be a stepping stone for the formation of sources of economic independence for the community. - Eliminating the trend of behavior in demanding society. 	<ol style="list-style-type: none"> 1. Agree with the community to direct the CSR program to productive activities based on the potential of each village to target long-term benefits and orient the community's economic independence (for example: entrepreneurial programs). This is manifested in the form of a roadmap CSR. 2. Discuss with the community about CSR activities that will be carried out in accordance with the roadmap agreed. This can be done through 	<ol style="list-style-type: none"> 1. Discussions with the community and a CSR roadmap that targets long-term benefits and is oriented towards the establishment of community economic independence. The agreement also includes clarity of roles and responsibilities between PT DAS and the CSR recipient community. 2. There was a discussion between PT DAS and the community regarding CSR programs that will be implemented in accordance with the agreed CSR. 3. PT DAS fulfills its roles and 	<ol style="list-style-type: none"> 1. The formation of community perceptions regarding the CSR program as a community development program with a clear orientation and must be accounted for. 2. The formation of public awareness and interest in utilizing CSR programs as a trigger for sustainable business activities, so that the submission of consumptive CSR proposals can gradually decline. 	<ol style="list-style-type: none"> 1. Discussion and outreach with the community regarding the CSR roadmap and planning every 1 year. 2. Evaluation of CSR proposals from the community is incidental. Evaluation of CSR implementation every 1 year

Social Impact and Risk Aspects	Objectives	Action	Indicator	Expected Impact	Timeline
		<ul style="list-style-type: none"> submitting proposals or through discussions in meetings. 3. Carry out the role of PT DAS in the CSR program in accordance with the terms of reference / roadmap agreed upon with the community. 4. Assist the community so that the community can fulfill its role in accordance with the agreed terms of reference / roadmap. 	<ul style="list-style-type: none"> responsibilities in implementing CSR in accordance with the agreed roadmap. 4. Communities fulfill their roles and responsibilities in implementing CSR programs. 	3. An increase in the quality of the community's economy which is triggered by the CSR program.	
New income potential.	Making the needs of PT DAS operational activities a potential source of business for the community.	<ul style="list-style-type: none"> 1. Initiate the formation of business groups / farmer groups to become an organized forum. 2. If needed, provide assistance and / or training to the community to develop and manage businesses. 	<ul style="list-style-type: none"> 1. Initiate the formation of business groups / farmer groups to become an organized forum for potential business opportunities that can be developed by the community. 2. If needed, provide assistance and / or training to the community to develop and manage the business. 	The formation of public awareness and interest in developing and managing businesses.	<ul style="list-style-type: none"> 1. Evaluate the operational needs of PT DAS as a new business opportunity for the community every 1 year. 2. The initiation of group formation and assistance is incidental.
Social jealousy related to the difference in the amount of GRTT.	Jealousy between communities and their impact in the continuation of the GRTT process is mitigated.	<ul style="list-style-type: none"> 1. Outreach to the public to take advantage of the complaint facility to PT DAS to obtain information on complaints that the community has. 2. Socialization of the progress of the new PT DAS plantation development, including plans to acquire land rights (if any). 3. Dissemination of the GRTT procedure, including by reference to the amount of compensation value and other determining factors for the amount of value used by PT DAS. 4. Continue the GRTT process (if there is still a land acquisition plan) in accordance with the applicable procedures. 	<ul style="list-style-type: none"> 1. Jealousy related to the GRTT value is not a social issue that develops in the community. 2. The the community makes use of the complaint facility to obtain information on complaints. 3. If there is a land acquisition plan, the community will get socialization with complete information about the GRTT process, including the procedures and references used in determining the amount of compensation value. 4. The GRTT process is carried out by following the applicable SOP and is well documented. 	<ul style="list-style-type: none"> 1. The results of GRTT do not become a new potential issue within the community or between the community and PT DAS. 2. The continuation of the GRTT process (if any) can be done quickly in accordance with the applicable SOP. 	Social jealousy related to the difference in the amount of GRTT.
Reduced land resources.	Optimizing the use of available land.	<ul style="list-style-type: none"> 1. Initiate the formation of farmer groups as a forum to improve the quality of community agricultural management. 2. If needed, provide training to improve the quality of community agricultural management / farmer groups. 	Productivity of community agricultural land increases.	The need for new land for community agriculture has decreased. 2. Community income from existing agricultural land increases.	<ul style="list-style-type: none"> 1. The initiation of the formation of farmer groups and the provision of training is incidental. 2. If necessary, participatory monitoring of community

Social Impact and Risk Aspects	Objectives	Action	Indicator	Expected Impact	Timeline
					agricultural products is conducted every 1 year.
<ul style="list-style-type: none"> - The negative image of PT DAS due to the delay in new development plans. - High expectations of the community to get an allocation from the development of new plasma plantations. 	The public is informed about the background of the delay and the progress of the new development plan.	<ol style="list-style-type: none"> 1. Outreach the commitment of PT DAS as a member of the RSPO and its consequences for new development plans. 2. Outreach to the public regarding the new development plan and the timeline for its realization. 	<ol style="list-style-type: none"> 1. The community gets socialization about PT DAS 'commitment to being a member of the RSPO and its consequences for the new development plan. 2. The community gets socialization to the community regarding the new development plan (if any) and the time frame for its realization. 	<ol style="list-style-type: none"> 1. The community has an understanding of the provisions in new developments that must be followed by PT DAS as a member of the RSPO. 2. Negative perceptions of companies regarding delays in new development plans can be corrected. 3. New developments (if any) can be implemented as planned. 	<ol style="list-style-type: none"> 1. The negative image of PT DAS due to the delay in new development plans. 2. High expectations of the community to get an allocation from the development of new plasma plantations.
Increase in the number of occupations / land claims.	There is no occupation / land claim in the GRTT area.	<ol style="list-style-type: none"> 1. Hold discussions with community members who occupy the land and explain that GRTT has been carried out (if it has been done) by showing evidence of GRTT implementation. 2. Maintain a strong documentation system as evidence of GRTT implementation. 3. If necessary, take legal proceedings to resolve land occupation problems. 	<ol style="list-style-type: none"> 1. Resolved occupation / land claims problems in the area that has been GRTT. 2. Documentation of the GRTT process is well and complete according to the SOP of PT DAS. 	The number of occupations / land claims in the GRTT area has decreased.	Increase in the number of occupations / land claims.
Degradation of conservation areas.	There are no activities that cause degradation / destruction of the conservation area.	<ol style="list-style-type: none"> 1. To prohibit logging in the PT DAS concession area. 2. Outreach to the public regarding the protection of conservation areas. 3. If necessary, involve the community in securing the conservation area. 	<ol style="list-style-type: none"> 1. Actions are carried out on individuals who carry out activities that are degradative / destructive to the conservation area. 2. The community received information about the protection of the conservation area in the PT DAS concession area. 3. If necessary, the community is involved in protecting the conservation area in the PT DAS concession area. 	<ol style="list-style-type: none"> 1. The number of activities that are degradative / constructive in nature to the conservation area in the PT DAS concession area has decreased and is gradually disappearing. 2. The community has the awareness to participate in protecting the conservation area. 	Degradation of conservation areas.

4.2.2 Social Environment Impact Assessment (SEIA/ AMDAL) Management & Monitoring Plans

The Social Environment Impact Management & Monitoring Document (RKL-RPL) was approved by Head District of Ketapang, by decree number 525/KLH-B/2016, dated: 03 August 2016.

Table 55: Summary of Management and Mitigation Plans on Environment Impact Assessment

No	Impact	Source of Impact	Location	Environment Management		Environment Monitoring	
				Plan	Period	Indicator & metode	Period
1	People's behavioral and perception, also Social Conflict	<ul style="list-style-type: none"> - Operational socialization - Company's delineation, land acquisition - Land clearing - Transportation of FFB - De-mobilization of equipment 	Hamlet of Sepahan and Muara Kayong, Villages of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara	<ul style="list-style-type: none"> - Participatory Mapping - Socialization on every steps of activity transparently to villagers - Good engagement and communication with community's leader and public figure - Carried out the land compensation in appropriate with the agreement - Work & coordination with government institutions of village, district and related agencies - Performs various activities that show company's concern to community interest - CSR activities according to local people needs 	At least once before the operational socialization, and continued during the land acquisition	<p>Increasing the positive perception of the public against the plantation activities.</p> <p>Methods: observation and interviews</p>	Once a year during the oil palm plantation operational
2	Increased of job opportunities	<ul style="list-style-type: none"> - Oil palm cultivation - Employee recruitment 	Local people from Hamlet of Sepahan and Muara Kayong, Villages of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara	<ul style="list-style-type: none"> - Transparently open recruitment - Give the priority to local people to work at the plantation, as long as meet the qualifications required - Providing the employees' rights in appropriate with the regulations 	Continuous every recruitment activity	<ul style="list-style-type: none"> - There are no disputes and disagreement between the community with the company or with the workers in the company. - Workers database 	Workers reporting to Labor Agencies once per year

	Increased of bussiness opprotunities	<ul style="list-style-type: none"> - Employee recruitment - Oil palm plantation operational 	Hamlet of Sepahan and Muara Kayong, Villages of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara	<ul style="list-style-type: none"> - Work with local communities to do - Training of entrepreneurship 		-	
3	Ambient air quality	<ul style="list-style-type: none"> - Land clearing - Mobilization of heavy equipment and materials - Land clearing - Transportation of FFB - De-mobilization of equipment 	Emplacement and the area around operational area.	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Watering the roads around the operational area to reduce dust - Plant to reforestation along the way around settlement and emplacement - Roads maintenance - Good maintenance of FFB transport vehicle to pressing the exhaust gas - Air quality testing <p><u>Socio-economic approach:</u></p> <ul style="list-style-type: none"> - Facilitating the communities to participate the reforestation - Socialization to the workers to wear mask at work - Financial allocating to implement technological, socio-economic and institutional approaches - Institutional approach: - Work with accredited institution/ laboratory to do air quality testing 	Regularly watering the roads during the land clearing phase Once every 3 months on dry season and once every 6 months on rainy season	<ul style="list-style-type: none"> - Parameters of air quality levels in accordance with laws and regulations (PP No. 41 Thn 1999) - Controlling and preventing the arising derivative impact of air quality reduction - Environmental quality analysis reports to relevant agencies 	<ul style="list-style-type: none"> - Once per 6 months. - Reporting to relevant agencies: once per 6 months
4	Increased rate of noise level	<ul style="list-style-type: none"> - Land clearing - Mobilization of heavy equipment and materials - Construction of operational facilities & infrastructure - Transportation of FFB 	Emplacement, main road and the area around operational area	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Routine maintenance of heavy equipment used during land clearing and infrastructure construction - PPE used - Implement the rate limit of vehicle 	Every day on land clearing and infrastructure construction phase	<ul style="list-style-type: none"> - Parameters of noise levels in accordance with laws and regulations (PP No. 41 Thn 1999) 	<ul style="list-style-type: none"> - Once per 6 months. - Reporting to relevant agencies: once per 6 months

5	Public health level (include workers)	<ul style="list-style-type: none"> - Mobilization of heavy equipment and materials - Maintain oil palm plants 	Plantation area and around	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Routine medical check up to the workers - Socialization of the important to wear PPE - Provide the medical clinic <p><u>Socio-economic approach:</u></p> <ul style="list-style-type: none"> - Provide the appropriate PPE for workers - Giving supplements to workers who susceptible to contamination due to the operation of the tools plantations - Providing health insurance for workers - Provide environmental sanitation such as toilet construction which is eligible. <p><u>Instituional approach:</u></p> <ul style="list-style-type: none"> - Working closely with agencies such as health centers in the preparation of medical personnel and clinics 	Four times during construction phase	<p>Decrease levels of public health and workers by the increasing number of visits due to respiratory diseases.</p> <p>Methods:</p> <ul style="list-style-type: none"> - Medical check up for the workers - data analysis from the company clinic 	Once per 6 months
6	Decrement of Water quality & aquatic biota	<ul style="list-style-type: none"> - Land clearing - Nursery activity - Maintaing oil palm plants 	On the river and riparian area on the PT DAS area	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - No land clearing on the riparian area/ greenbelt. Put the signboard of prohibition to damage the riparian area - Choosing a nursery locations in flood-free land - Maintain a buffer zone with plants that can withstand erosion rates - supervise and control the use of chemical fertilizers and pesticides - Do not clean the working tools int the river - POME test before its application to plantation <p><u>Socio-economic approach:</u></p> <ul style="list-style-type: none"> - Socialization to the workers and community, about land and water conservation, protected area and riparian area conservation - Budget allocation to water conservation, protected area and riparian area conservation 	<ul style="list-style-type: none"> - Once every 3 months on dry season and once every 6 months on rainy season - POME test: once per month 	<ul style="list-style-type: none"> - There are no water pollutan by chemicals, waste, POME and any other opertional activities impacts. - Environmental quality analysis reports to relevant agencies <p>Methods: water quality testing based on government regulation (parameter TSS, TDS, BOD, COD, Ammonia, Total Fosfat dan pH, based on PP No. 82 Thn 2001).</p> <p>-</p>	<ul style="list-style-type: none"> - Once per 3 months. - Reporting to relevant agencies: once per 6 months
7	Increased rate of erosion	<ul style="list-style-type: none"> - Land clearing - Construction of operational facilities & infrastructure 	Plantation Area	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Land clearance without destructive the topsoil - Maintaining the drainage and roads through road hardening, to reducing the erosion rate 	Continuous during land clearing phase	Measuring the erosion rate	Once per 6 month

8	Land and forest fire potential	<ul style="list-style-type: none"> - Land clearing - Construction of operational facilities & infrastructure - Replanting 	Plantations area and around	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Land clearing without burning - Construction the fire tower control - Firebreak tracking - Form and trains the fire fighting team - Create and maintain reservoirs (water basins) in the catchment area with adequate capacity - Procurement of facilities and infrastructure of fire control and fire fighting management refers to Surat Direktorat Jenderal Perkebunan Departemen Pertanian No. 824/LB.130/E.6/10/09 (<i>Lampiran 7</i>) - Periodically patroli especially on dry season <p><u>Socio-economic approach:</u></p> <ul style="list-style-type: none"> - Socialization to the community to do land clearing without burning - Involving the community to provide and maintaining drainage and planting of cover crops - Involving the community in providing the seeds for enrichment plants and rehabilitations <p><u>Institutional approach:</u></p> <ul style="list-style-type: none"> - Work with related agencies (Manggala Agni, BKSDA, etc) to implement the fire prevention program - Forming the firefighting group and provide them with fit training 	Continuous intensively, especially on dry season	<p>There is no land fire in the company and around.</p> <p>Methods: field survey monitoring & online hot spot monitoring</p>	Continuous intensively, especially on dry season
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9	Biodiversity of Flora & Fauna	<ul style="list-style-type: none"> - Land Clearing - Construction of operational facilities & infrastructure 	Plantation Area	<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Protection of flora & fauna on the area with good condition of ecology - Put the information boards for prohibition illegal logging of protected species of flora (especially on riparian area and area near the protected forest) and illegal hunting. - planting and maintaining the ecological functioning types of vegetation for the existing animals, so as they have space for feeding, covering, and breeding <p><u>Socio-economic approach:</u></p> <ul style="list-style-type: none"> - Socialization to the community about biodiversity of flora & fauna surrounding the operational area - A persuasive approach to the community not to do the activities that cause the loss of protected flora & fauna and have an ecological function, in the plantation area, riparian area and near to protected forest <p><u>Institutional approach:</u></p> <p>Involving the related agencies, in efforts to protect and preserve the protected flora & fauna around the operational area</p>	Once per 3 months, continuous intensively when its needed	<ul style="list-style-type: none"> - Biodiversity index of flora and fauna - Disruption to protected flora and fauna <p>Methods: field survey</p>	Once per 3 months, or continuous intensively when needed
	Pencemaran Toxic & Hazardous Waste	<ul style="list-style-type: none"> - Maintenance of oil palm plant 		<p><u>Technology approach:</u></p> <ul style="list-style-type: none"> - Provide building Temporary Storage Sites for hazardous and toxic waste that meets the requirements - Temporary storage of hazardous and toxic waste for a maximum of 90 days - management of hazardous and toxic waste with third parties that have licensed from relevant government agencies 	During the operational of PT HPE	-	
10	Pests diseases	<ul style="list-style-type: none"> - Plant maintenance 	Plantation Area	Implementation of integrated pests management	Every pests and diseases handling	Survey and identification of pests type and attacks	Every pests and diseases handling

11	Decreased of job opprotunities	- Post-operational workers release	Local people from Villages of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara	<ul style="list-style-type: none"> - Provide an information transparently to the workers, regarding the end of plantation operational & work termination - Do the work termination in appropriate to regulations 	Before and after work terminationa	<ul style="list-style-type: none"> - There are no disputes and disagreement between the community with the company or with the workers in the company. - Workers database 	Once during the wrok termination phase
12	Social conflict	Post-operational handling of fixed assets	Local people from Villages of Sungai Kelik, Sub-district of Nanga Tayap; Hamlet of Nek Doyan, Village of Laman Satong, Sub-district of Matan Hilir Utara	<ul style="list-style-type: none"> - Good engagement and communication with community's leader and public figure - Carried out the land return in appropriate with the agreement 	Once during handling of fixed assets phase	<p>There are no disputes and disagreement between the community with the company or with the workers in the company.</p> <p>Methods: observation and interviews</p>	Once during handling of fixed assets phase

4.2.3 High Conservation Value (HCV) Management & Monitoring Plans

The general objective of HCV management is to maintain the HCV element; (if needed), the important value of the area can be enhanced. Maintenance of HCV elements is a minimum requirement for HCV management. The general management recommendations for the HCV area are as follows:

- 1) Prepare the HCV Management Plan immediately by considering:
 - Plantation development plan should be taken into an account conservation principle,
 - RTE species protection consideration, especially related to the presence of orang-utans through managing core areas and connectivity between habitats,
 - Strengthening communication links with other companies in vicinity to develop management and action plans for protecting HCV areas outside MU such as peatlands on the west and the Lingkar River.

- 2) Institutions and HCV management capacity building:
 - Establish a management unit to ensure the implementation of HCV management to achieve its objectives
 - Train staff or recruit new staff with enough necessary qualifications

- 3) Strengthening capacity in identification, management, monitoring and evaluation:
 - Develop detailed Management and monitoring of HCV areas SOP
 - Implementation of procedures and policies consistently
 - Compilation of new procedures and protocols

- 4) Delineating and demarcating identified HCV areas and installing proper sign board to raise public awareness regarding HCV area information

- 5) Disseminate information to internal parties (daily workers and staff) and externals (communities in the surrounding villages; government agencies; neighboring companies that have direct contact with the HCV area) regarding the existence of HCV areas and their functions.

The objective of monitoring is to know the progress of the condition of the elements and the area of the determined HCV. In addition to monitoring HCV element indicators, monitoring of management strategies also includes:

- 1) Field implementation of management strategies, related to the effectiveness on the implementation of planned HCV management strategies (operational monitoring)
- 2) Implementation of management strategies is done poorly. Even though the planned management strategy is good, if done poorly it will not achieve the expected goals and objectives (strategic monitoring/effectiveness)
- 3) New or changing threats/conditions. Effective management strategies at one time may not always be effective forever (threat monitoring).

The results of this monitoring are the basis for evaluation to ascertain whether the implementation of the HCV area management strategy is in accordance with its goals and objectives. The direction in the HCV area management system is an adaptive management system where the management always strives to carry out continuous improvement in HCV management and monitoring.

Threat Assessment

A comprehensive approach developed by IUCN was applied to assess threat toward HCV and HCVMA. This approach only assesses direct threats to species, habitats or ecosystems. Threat category assessment based on IUCN threat Category (ITC) that has been verified in the field. Of the 12 categories, four threat categories were found in the operational areas of PT DAS, namely Agriculture/Plantation Activity, Pollution, biological use, and Transportation & service corridors (Table 18). From each threat there are 3 factors assessed, i.e. time (period of continuity of threat), scope (magnitude/proportion of affected area/object) and severity (rate of decline in quality due to pressure from threats).

The results of the intensity assessment of threats, are generally medium impact. Meanwhile, land clearing for oil palm plantations on shallow peatlands will relatively generate low impact. This is because only certain land is cultivated (mineral land or shallow peatland). However, it is different with logging activities which is occurred in all forested areas of PT DAS massively and the rate of deterioration due to the threat is very rapid (peatlands become bare and dry quickly). Therefore this threat is classified as high impact (Table 51)

Table 56: Threat assessment for each HCV and HCVMA in the location permit of PT DAS.

Index	Location Name	HCV Type	Source	Status of Threat	Risk/Threat	Scope	Severity	Intensity			
1	Peat swamp forest and lowland forest	1,2,3,4	Land clearing for community oil palm plantations in peatland areas in the southeastern part of PT DAS	Will repeat in a short time period	<ul style="list-style-type: none"> Disappearance / destruction of a exceptional peatland ecosystem The size and quality of animal habitat decreases Fragmented habitat and lost of animal connectivity Animal conflict between human and orangutan Excessive drainage of peatland through canals Peat water level drops to critical level Peatland becomes dry and very prone to fire, especially during the dry season 	Minority (1)	Slow (1)	Low impact			
			The company's plan to clear land for planting new oil palm in the northern part of the PT DAS area on deep peat areas	Future Plan		Majority (2)	Very Rapid (3)	Medium Impact			
			Illegal logging of forests by the community	Will repeat in a short time period		Whole (3)	Very Rapid (3)	High impact			
			The company's plan to build block lines, the initial stage of land clearing in the peat area	Future Plan		Minority (1)	Very Rapid (3)	Medium Impact			
2	Pelaik Hitam River and it's Riparian zone	1,2,3,4	The company's plan to clear land for planting new oil palm in the northern part of the PT DAS area	Future plan	<ul style="list-style-type: none"> Deterioration of Pelaik Hitam riparian zone ecosystem Loss of flood buffer area around the river Decreased water quality Potential contamination of heavy metals such as Fe, Al, and Pb (due to oxidation of the sulfide layer) 	Majority (2)	Very Rapid (3)	Medium Impact			
			Illegal logging of forests by the community	Will repeat in a short time period					Whole (3)	Very Rapid (3)	High impact
			Company plantation operations (Agricultural effluent), such as fertilizing applications, pesticides, herbicides around riparian zones of the Pelaik Hitam River	Will repeat in a short time period							
3	Lingkar River and it's Riparian zone	1,2,3,4,5	Land clearing for community oil palm plantations in downstream shallow	Will repeat in a short time period	<ul style="list-style-type: none"> Deterioration of Lingkar river's riparian zone ecosystem 	Minority (1)	Slow (1)	Low impact			

Index	Location Name	HCV Type	Source	Status of Threat	Risk/Threat	Scope	Severity	Intensity
			peat areas around the west		<ul style="list-style-type: none"> • Lost of flood buffer area around the river • Decreased water quality • Animal conflict between human and orangutan • Potential contamination of heavy metals such as Fe, Al, and Pb (due to oxidation of the sulphide layer) 			
			Illegal logging of forests by the community	Will repeat in a short time period	<ul style="list-style-type: none"> • Decrease of the size and quality of animal habitat • Fragmented habitat and lost of animal connectivity 	Whole (3)	Very Rapid (3)	High impact
4	Peatland with semi natural vegetation cover	1,3,4	Land burning by irresponsible parties	Will repeat in a short time period	<ul style="list-style-type: none"> • Loss of vegetation cover • Peatland fires 	Whole (3)	Very Rapid (3)	High Impact
			The company's plan to build blockade and drainage lines.	Will repeat in a short time period	<ul style="list-style-type: none"> • Drained of peatlands • Depreciation of peat substrate • Potential contamination of heavy metals such as Fe, Al, and Pb (due to oxidation of the sulphide layer) 	Whole (3)	Slow (1)	Medium Impact
			Catching migratory birds in the shrub area	Will repeat in a short time period	<ul style="list-style-type: none"> • Decline of migrant bird populations and other bird species 	Minority (1)	Slow (1)	Low Impact
5	Areas with disturbed vegetation in peat swamp forests, river banks which cross gardens, and mixed dipterocarp ecosystems. The natural condition of the area needs to be restored	HCVMA – No Go Area supports HCV 1, 2, 3, dan 4 (#ID 1, 2, dan 3) area	Plans for the construction of oil palm plantations (have been cleared but not yet planted with oil palm)	On going and will repeat in a short time period	<ul style="list-style-type: none"> • Potential contamination of heavy metals such as Fe, Al, and Pb (due to oxidation of the sulphide layer) • Excessive drainage in pea land will causes severe drought on the surface and very prone to land fires during the long dry season 	Majority (2)	Very Rapid (3)	Medium Impact
			Land burning by local people		<ul style="list-style-type: none"> • Loss of vegetation cover • Disruption of the succession process • Damage to the peat substrate 	Minority (1)	Slow (1)	Low Impact
6	Orangutan distribution area, peat area with a depth of > 0.5 m, and Putri River	HCVMA – Go Areas supports HCV 1, 2, 3, dan 4	Oil palm plantation operations, which include the use of fertilizers and chemical pesticides, surface water drainage, and encroachment	On going and will repeat in a short time period	<ul style="list-style-type: none"> • Potential for water pollution from agrochemical applications • Peatland subsidence caused by excessive drainage 	Minority (1)	Slow (1)	Low impact

Index	Location Name	HCV Type	Source	Status of Threat	Risk/Threat	Scope	Severity	Intensity
	KEE area	(#ID 1, 2, dan 3) area			<ul style="list-style-type: none"> Animal conflict between human and orangutan 			

Table 56: HCV and HCVMA Management and Monitoring Recommendation in PT DAS and its surrounds

Element HCV	Index	Purpose	Management Objectives	Management Strategy		Monitoring Frequency	PIC
				Areas	Activity		
HCV 1 important species (protected, rare or endangered)	1-4	Maintaining the existence of important species Maintain the habitat of important species as a place to find food, perch, and breed	The population of fauna species does not decrease (if possible increases) Habitat of important flora species is not disturbed Habitat of important fauna species is not disturbed	Lingkaran River and riparian zone Pelaik Hitam River and riparian zone Good area of peat forest	<ul style="list-style-type: none"> Socialize the presence of HCV area to surrounding communities Formulate document monitoring documentation of important species (6 months) in the HCV area periodically Produce additional documentation related to important events in the HCV area (such as hunting of animals or meeting important fauna species) Install warning boards related to the presence of HCV areas Prohibition of hunting in the HCV area Prohibition of encroachment in forest areas and riparian zone areas Prohibiting the use of toxic materials for fishing in rivers Periodically patrol the perimeter of the HCV area Delineate and determine the boundaries of the riparian zone and forest area as important species habitat 	Once per 6 (six) months	<ul style="list-style-type: none"> Sustainability & Conservation Staff, work with Management of PT DAS. The patrol mechanism is established by the conservation department and ensures it goes on schedule
HCV 2 Peat Forest on a wider scale as buffer area for Putri River essential ecosystem (KEE)	1-3	Maintain connectivity with wider peat forests outside the company's operational area Maintain the	The existence of forest land connected to a wider forest area (connectivity/corridor)	Good forest area	<ul style="list-style-type: none"> Periodically patrol the perimeter of the HCV area Prohibition of encroachment in forest areas Coordination with relevant 	Once per 6 (six) months	<ul style="list-style-type: none"> The patrol mechanism is established by the conservation

Element HCV	Index	Purpose	Management Objectives	Management Strategy		Monitoring Frequency	PIC
				Areas	Activity		
HCV 3 peat forest ecosystem	1-4	presence and good quality of peat forests and not fragmented because of threats from land fires and logging	Good land coverage		stakeholders (NGOs, government, community) in maintaining wider forest area <ul style="list-style-type: none"> Analyse the landscape of wider kerangas forest connectivity based on regular satellite images (3 months) Supporting collaborative activities related to the concept of area management (Putri River landscape) 	Once per 6 (six) months	department and ensures it goes on schedule <ul style="list-style-type: none"> Monitoring of land caover changes by Conservation Dept.
HCV 4 Ecosystem services from: Lingkarán River and riparian zone Pelaik Hitam River and riparian zone Peatlands	1-4	Maintain the good river flow	Sedimentation from the PT DAS plantation area that enters the Pelaik Hitam river is reduced Cliff morphoerosion Pelaik Hitam River and Lingkarán River decreases Elements of river water quality (TSS / TDS, color, odor, heavy metals) River water level Inundation / flood area	River Flow	<ul style="list-style-type: none"> Periodically collect river water samples to monitor river water quality (TSS / TDS, color, odor, heavy metal), once every 6 months, at the location of the Pelaik Hitam River inlet and outlet and at the Lingkarán River outlet Monitoring extreme water level (with installation of water level boards) in the areas around the Lingkarán and Pelaik Hitam river grooves that are prone to flood / inundation Making plaster in river segments that are very vulnerable to river cliff landslides Normalization of the flow of the Lingkarán River, many fallen trees that cross the river 	Once per 6 (six) months	Environmental and water testing coordinated by estate manager and sustainability staff, and will be done once every six months
		Maintain the river water quality in accordance to the quality standard threshold (class 2)	the presence of natural vegetation in riparian zones Type of vegetation in riparian zone (local or external input)	Riparian zone (river buffer area)	<ul style="list-style-type: none"> The boundary of the riparian zone area. Determination of the width of the buffer boundary in the field (15 meters of the Pelaik Hitam River / 2 oil palm principal and 50 m Lingkarán River) Installation of warning boards related to the existence of HCV 4 Recovery of riparian zone areas that are already open with reforestation activities (woody plants and bamboo 	Once per 6 (six) months	Agronomy assistant ensures that no chemicals are used by their workers that can contaminate water bodies

Element HCV	Index	Purpose	Management Objectives	Management Strategy		Monitoring Frequency	PIC
				Areas	Activity		
					species) <ul style="list-style-type: none"> Prohibition of timber and land encroachment (for community gardens / fields) in riparian zone Agrochemical applications are appropriate and efficient (application restrictions) on land that has been converted as an oil palm plantation 		
		Maintain good peat water system (undisturbed) Preventing land fires on peatlands Maintain good condition of peatland cover and supporting natural succession on open peatlands Avoiding the contamination of heavy metals (Fe, Al, Pb) so that the soil becomes more acidic (very low pH)	Depths of water on peatlands that are already open (there are drainage canals) not exceeding the critical limit (50-60 cm) Areas of peatland that are prone to fire The condition of peatland cover The substrate layer of peatland is sulphide material	Peatland	<ul style="list-style-type: none"> Regular patrols to monitor logging activities Closing potential timber loggers to enter a good peat forest area Cooperating with law enforcement officials to take action against loggers in the PT DAS concession area Installation of peat water level monitoring devices on several representative points Avoid making drainage canals on peatlands that are not yet open Make water gates and install water levels in drainage canals Making fire towers Early detection of causes of fire on peatlands (especially in shallow peat areas around rivers) Make a sign board for warnings on land fire prone areas Making special institutions to handle land fire events Create an SOP to handle land fire events Identification of peat substrate which has sulphide compounds (pyrite / FeS₂) Making SOP protection against acid soils (low pH) 	Once per 6 (six) months	<ul style="list-style-type: none"> The patrol mechanism is established by the conservation department and ensures it goes on schedule The supporting infrastructure for water monitoring is managed and monitored by the estate manager

Element HCV	Index	Purpose	Management Objectives	Management Strategy		Monitoring Frequency	PIC
				Areas	Activity		
		Building mutual understanding regarding the importance of the existence of conservation area Good relationships and communication with stakeholders regarding the management of wider peat areas (KEE Sungai Putri), Rivers & riparian zones	Strengthening stakeholder relations regarding harmonization of conservation activities	Stakeholder	<ul style="list-style-type: none"> • Socialization regarding the importance of river maintenance and riparian zone to staff / employees and surrounding communities • Supporting collaborative activities with stakeholders (neighbouring companies, government and surrounding communities) in maintaining the river and its riparian zone and KEE Putri River • Create a joint forum to facilitate coordination and cooperation 		Management of PT DAS & Conservation Dept, work with CSR Staff
HCV 5 Lingkaran River	3	There is sustainability related to the availability of protein sources (fish) for the community	Water quality Fish stock	Lingkaran River	<ul style="list-style-type: none"> • Collaborating with sub-villages to issue regulations prohibiting fishing using stun and poisons. 	-	Conservation Dept. work with CSR Staff & workers.
HCVMA No Go Areas	5	Land restoration in the peat ecosystem, mixed dipterocarp ecosystems, and river borders	Land cover	Areas with disturbed vegetation in peat swamp forests, river banks cross gardens, and mixed dipterocarp ecosystems.	<ul style="list-style-type: none"> • Protecting disturbed peatland and mixed dipterocarp forests so that natural succession occurs • Provide protection on the border of the river • Restoration of threatened ecosystems and river borders by planting natural plants around the area • Formulate SOP for orangutan conflict mitigation with humans • Disseminating information to employees and the community • Documenting every orangutan encounter 	-	Conservation Dept, work with GIS & Estate Manager
HCVMA Go Areas	6	Plantation management by maintaining water levels, avoiding	Plantation operational	Overlapping land between KEE Sungai Putri, Orangutan distribution area,	<ul style="list-style-type: none"> • Implementation of BMP oil palm plantations on peat land (RSPO, 2013) • Create an Orangutan-human conflict mitigation SOP 	-	Management of PT DAS, Conservation Dept, Estate

Element HCV	Index	Purpose	Management Objectives	Management Strategy		Monitoring Frequency	PIC
				Areas	Activity		
		human-wildlife conflicts, and avoiding pollution		and peat (> 0.5 m) with garden operational area	<ul style="list-style-type: none"> • SOP socialization to employees and the community • Documenting every orangutan encounter 		Manager & Agronomy Assistant

4.2.4 High Carbon Stock (HCS) Management & Monitoring Plans

Most of the HCS areas in PT DAS are in the HCV area, with similar threats. For this reason, the management will be carried out concurrently with the management of the HCV area. By involving more communities around the PT DAS area, especially in forest patrol programs, alternative livelihoods/ acquisition of protein sources in order to prevent illegal hunting, enrichment of forest plants and nurseries. It is also management based on social forestry, as well as trying to monitor the carbon value.

In addition, within its permit area, PT DAS allocates an area for food security for local communities. Collaborating with local communities to manage the paludiculture area, the villages involved in Ulak Medang and Sungai Kelik. at this time the activity has taken place covering an area of 10 ha in collaboration with the hamlet of Sepahan, Sungai Kelik village.

4.2.5 Soil Management and Monitoring Plans

To manage oil palm planting on sandy soil, Bumitama as a Head Company of Hungarindo already has the Standard Operation Procedure (SOP), BGAAGRKS-SOP-16 "Pengelolaan Lahan Marjinal". Based on the SOP, the sandy land which plan to be planted by oil palm will be managed as follows:

- a. Land clearing will be done by manual process
- b. In the sandy area which have hardpan layer, need to built a discontinue ditches
- c. Making the planting hole with a "big hole"
- d. The use of empty bunch
- e. Vegetation management "ground management" (soil and water conservation) Micro fertilization and CRF
- f. Planting for *Mucuna bracteata*

4.2.6 Greenhouse Gas Management & Monitoring Plans

Steps to Manage and Increase the Carbon Stock

a. Land Use Change / New Planting

Land conversion appeared as the largest emission factor contributing to 2,144.64 tCO₂e

Target	: Reduction of emissions from land clearing activities
Action Plan	: <ul style="list-style-type: none">▸ No land clearing of conservation and peat area▸ Management plan of conservation areas▸ Development of fire mitigation and completion of firefighting equipment

b. Carbon Crop Sequestration

Carbon crop sequestration contributes to emissions reductions to -5,407.16 tCO₂e

Target	: Incease of carbon crop sequestration
Action Plan	: <ul style="list-style-type: none">▸ Use of seeds with high production potential▸ Use of land cover crops

c. Fertiliser

Emission source: manufacturing of the fertilizer and its application on the field.

Target	: Emission reduction from fertilising
Action Plan	: <ul style="list-style-type: none">▸ Leaf & soil analysis to obtain the data of optimal amounts of fertilizer applied;▸ Empty bunch used for mulching (composting)▸ Fertilizers application technique based on topography▸ proper fertilization dose, right time and place, and in accordance with the Good Agricultural Practice

d. Diesel Consumption in Operation

Fuel Consumption in the field contributed to 207.24 tCO₂e

Target	: Reduction of emission from Diesel Consumption in Operation
Action Plan	: <ul style="list-style-type: none">▸ Good maintenance of vehicles and other equipment, periodically▸ Safety of driving related training

e. HCV Crop Sequestration

Crop sequestration from the conservation area appeared as the largest emission reduction factor, contributing of -10,179.55 tCO₂e

Target	: Increase of carbon sequestration
Action Plan	: <ul style="list-style-type: none">▸ Rehabilitation on the Conservation Areas which has open land and/or bushes as a land cover▸ To monitor the Conservation Area from any other activities▸ Work with the local community to protect the Conservation Area

Monitoring of the Action Plan implementation

a. Land Use Change/ New Planting

Monitoring of land clearing

Action Plan	Timeline
To monitor the plans for land clearing and its realisation	December 2021 – July 2022 (During land clearing phase)

b. Carbon Crop Sequestration

Monitoring carbon crop sequestration

Action Plan	Timeline
To make sure that seed is good quality and with a government license	January 2022 – July 2022 by QC Dept.

Action Plan	Timeline
To monitor the realisation of oil palm planting & legume cover crops	April 2022 – August 2022 by QC Dept.
To minimise FFB losses	On mature plant (2025) by QC Dept

c. Fertiliser

Monitoring fertiliser emissions

Action Plan	Timeline
▸ To monitor leaf and soil analysis activity	Once every 1 year, on April – May by Research Dept.
▸ To monitor empty bunch application for mulching	When its applied by Quality Control Dept.
▸ To monitor plan and realisation of fertiliser application	Every fertiliser application by Estate Assistant and QC Dept.

d. Diesel Consumption for Transport

Monitoring fuel consumption in the operational activity

Action Plan	Timeline
▸ To monitor the fuel consumption of each device and vehicle	Every month by Traction Dept.
▸ To analyse work of equipment compared to its fuel consumption	Every month by Traction Dept.
▸ To monitor planning & realisation of training related with driving safety	Once every 6 months by Training Center

e. HCV Crop Sequestration

Monitoring carbon sequestration of the HCV Areas

Action Plan	Timeline
To monitor the planning and realisation of HCV areas rehabilitation, where the land cover is grassland or open land	Once every 6 months by Conservation & Sustainability Dept.

5. References

Putra Wibowo Malau, Hidayat Aprilianto Muhammad Vikky Arindi, Jan Rahman Simarmata, Idung Risdiyanto, July 2021. Spatial Habitat Suitability Models of Kalimantan Orangutan (*Pongo pygmaeus wurmbii* Linn, 1760) Using Principal Component Analysis in Conservation Area, PT Damai Agro Sejahtera, Ketapang, West Kalimantan; *Journal of Palm Oil and Palm Oil Research* Vol. 2, No. 2.

Berdasarkan Running et al. (1994) dan Huete dan Justice (1999) di dalam HCS Approach toolkit 2015.

HCS Approach Steering Group, Eds (2015). *The HCS Approach Toolkit: No Deforestation in Practice (Version 1.0)*. HCS Approach Steering Group.

Konsorsium Revisi HCV Toolkit Indonesia, 2008. *Panduan Identifikasi Kawasan Bernilai Konservasi Tinggi di Indonesia*. Tropenbos International Indonesia Programme.

RSPO, 2014. *RSPO GHG Assessment Procedure for New Plantings (Version: December 2014)*. RSPO.

RSPO, 2014. *Carbon Assessment Tool for New Oil Palm Plantings (Version: June 2014)*. RSPO.

RSPO, 2015. *RSPO New Planting Procedure, Endorse by the Board of Governors on 20th November 2015*. RSPO.

RSPO, Forests People's Program, 2008. *Free, Prior and Informed Consent and the Roundtable on Sustainable Palm Oil: A Guide for Companies*.

SNI 7645-1. 2011. *Klasifikasi Penutupan Lahan*. BSN–Badan Standarisasi Nasional, Indonesia.


SNI 7724. 2011. *Pengukuran dan penghitungan cadangan karbon –Pengukuran lapangan untuk penaksiran cadangan karbon hutan (ground based forest carbon accounting)*. BSN–Badan Standarisasi Nasional, Indonesia.

Internal Responsibility

This document is the summary of assessment result on Environment Impact Assessment (EIA), Social Impact Assessment (SIA), High Conservation Value (HCV), Land Use Change Analysis (LUCA) and High Carbon Stock (HCS) in PT Damai Agro Sejahtera – District of Ketapang, West Kalimantan Province and has been approved by the Management of PT Damai Agro Sejahtera.

Gagas Dinamiga Aksenta

Management PT Damai Agro Sejahtera



Nandang Mulyaha

Team Leader of Assessments

Date: 20 October 2019



Kamsen Saragih

Director

Date: 20 October 2019

Assessments result document of PT Damai Agro Sejahtera by Gagas Dinamiga Aksenta (Aksenta), will be applied as one of the guidelines in managing oil palm plantation in PT Damai Agro Sejahtera



Kamsen Saragih

Director

Date: 20 October 2019

Document of Management Plans of Assessment, has been proposed and approved by the Management of PT Damai Agro Sejahtera.



Lim Sian Choo

Head of CSR and

Corp. Sustainability

Date: 03 September 2021



Kamsen Saragih

Director

Date: 03 September 2021