Summary of Assessment Reports and Management Plans for NPP

Kuala Lumpur Kepong Berhad

Kuala Krai District, Kelantan State (Kuala Gris Estate)
Bera District, Pahang State (Kemasul Estate)
Peninsular Malaysia

28 December 2018

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1. Executive Summary

Kuala Lumpur Kepong Berhad (hereinafter referred to as **"KLK"**) is a company working in plantation commodities and industries in Peninsular Malaysia, East Malaysia, Indonesia and Africa. KLK has been a member of the Roundtable on Sustainable Palm Oil (**"RSPO"**) since 18 October 2004. **KLK** has adopted the sustainable palm oil practices based on Roundtable on Sustainable Palm Oil (RSPO), and New Planting Procedure (NPP) as part of a sustainable palm oil management system.

KLK has a development plan to conversion of rubber plantation to oil palm crops in two of its estates in Peninsular Malaysia, namely Kuala Gris Estate and Kemasul Estate. The areas of conversion program will be referred to as the Proposed Project Area (PPA). In compliance to the requirement under RSPO, a New Planting Procedures for the development plan (i.e. conversion programs in the PPA) has been arranged by KLK. It includes Social Environment Impact Assessment (SEIA), High Conservation Value (HCV) Assessment, Land Use Change Analysis (LUCA), and Carbon Stock Assessment (CSA) and GHG Assessment for New Planting.

The assessment areas are part of KLK Berhad in Peninsular Malaysia, situated in an agricultural development area. Based on the legal status, the assessment areas are part of *Permanent Leased land (Freehold Grant)*. The assessment areas cover 1,357 hectares in the grant area of Kuala Gris Estate and 343 hectares in the grant area of Kemasul Estate. The remaining areas of the grants of Kuala Gris Estate and Kemasul Estate (1,113.04 ha and 118.07 ha, resp), consist of oil palm plantations that are already RSPO certified, and are therefore excluded from the current assessment.

The PPA covers 1,700 ha; Kuala Gris Estate 1357 ha in Kuala Krai District, Kelantan State and Kemasul Estate 343 ha in Bera District, Pahang State. In accordance with the development plan of KLK, the NPP process for the PPA is covered in a single NPP process. In addition, the development plan in the PPA comprise of conversion of plantation commodity in relatively small areas, therefore single NPP process for the development plan is considered sufficient.

Assessments involving social studies (i.e. SEIA, social HCV, SIA, and LUCA) show that there is no interaction (i.e. livelihood) of local people with lands in the PPA except for them who is working in the plantation. The study area was part of the larger rubber plantation complex in Malaysia developed before mid-1900 by a British company. It confirms that, currently, there are no ownership of land under the communities as group and/or as personal.

SEIA shows that several hypothetical impacts will emerge during the conversion program, but none of those is critically important. The impacts are mainly physical related to land cover change and soil tillage, such as runoff, soil erosion, and sedimentation in the streams. Temporarily loss of land cover will slightly affect the movement of certain species of wildlife that use rubber plantation as a shelter. Habitat change and migration of local wildlife are the direct impact to biological environment. It is resulted from changing old rubber covered land into bare land. Wildlife that have lost their habitat are predicted to migrate to other parts of plantation with good vegetation cover. However, by gradually converting the land accordingly to conversion plan, the loss of habitat can be tolerated and is predicted to be reversible. The migrated wildlifes will return to the converted areas once they have recovered their vegetation and land condition. On a positive note, wildlifes preferring bare land habitat will come to the converted areas. As part of the mitigation plans, a conversion

time frame is planned accordingly to allow lesser time of being a bare land and planting of LCC is required during the rainy season so that the process of covering bare land will progress smoothly. Socio-economic impact is mainly on the employees due to the change of jobs. For example, the rubber tapping worker will potentially lose their job, unless they are willing to acquire new skill needed in oil palm plantation.

HCV assessment found areas containing HCV 1 and HCV 4 in the PPA of Kuala Gris Estate and potential HCV 2 area outside the Kuala Gris Estate. The HCV 1 and HCV 4 areas are situated in the riparian and water stream of the Perigi River, Koh River, Slow Pok Long River, Teku River, and Galas River; while the potential HCV 2 area is found in the secondary forest to the East of the boundary of Kuala Gris Estate. Total of the HCV area in the PPA of Kuala Gris is 67.4 ha (5% of the PPA Kuala Gris). In the PPA of Kemasul Estate, the assessment did not find any area containing HCV elements as all of the area in the estate has been developed into agricultural plantation (i.e. rubber and oil palm) since more than 50 years ago.

The HCV areas in the grant area of Kuala Gris Estate (assessment area) consist of shrubs in riparian buffers, and rivers. The total size of HCV areas is ± 67.4 ha or equal to 4.96% of the total grant area. However, we found a secondary forest area on boundary of wider landscape in Kuala Gris Estate, this area defined as potential of HCV 2 outside grant area of Kuala Gris Estate with size 4,973.3 ha. The potential of HCV 2 outside grant area of Kuala Gris Estate overlapping with map of Central Forest Spine and Tiger Forest Lanscape, while some of the area inside grant area of Kuala Gris Estate are overlapping with map of Central Forest Spine and Tiger Forest Lanscape. However, the overlapping boundary of Kuala Gris Estate with the Tiger Conservation Landscape map is not part of the actual Tiger Conservation Landscape (TCL) as originally intended. The concept of the TCL was initiated in 2008 when the National Tiger Action Plan for Malaysia was enacted, *ca*. 75 years after Kuala Gris was developed into a plantation area. According to the Malaysian Conservation Alliance for Tigers (MYCAT), three types of tiger habitat in Peninsular Malaysia are identified based on tiger data collected by the Department of Wildlife and National Parks Peninsular Malaysia, namely: 1) Confirmed tiger habitats that include Totally Protected Areas and Permanent Reserved Forests with records of tigers; 2) Expected tiger habitats that include forest blocks physically connected to the confirmed tiger habitats but yet surveyed; and 3) Possible tiger habitats that include blocks of forest (and shrubs) isolated from the confirmed tiger habitats in all states with tigers. In Kuala Gris, none of these three tiger habitat types is found since the late 1930s. However, as the boundaries of Kuala Gris Estate are partly overlapping with the TCL and the Central Forest Spine (CFS), these overlapping areas are therefore identified as HCV Management Area (**"HCVMA"**). These areas do not consist of natural ecosystem because the entire plantation was developed ca. 90 years ago and so the area can be converted from rubber plantation into oil palm plantation. These areas are defined as areas that can be developed for oil palm plantations ("go areas") by taking into account the management recommendations which include to inform all staffs, workers and surrounding communities include migrant community regarding the presence of potential HCV 2 at the boundary of Kuala Gris and monitoring quality of secondary forest outside Kuala Gris Estate and presence of fauna species with visual observation method.

LUCA in order to identify liability due to non-compliant land clearing of the RSPO's P&C found that there is no conservation and remediation liabilities. The land use change analysis found that in the PPA, there is no land clearing prior to the HCV assessment, nor in the areas where planting is prohibited by the RSPO.

Carbon stock and GHG assessments show that the PPA Kuala Gris contains rubber and thicket land cover, while the PPA Kemasul contains only rubber land cover. Land cover carbon stock of the PPA Kuala Gris are 37.7 tonC/ha for the rubber and 48.0 tonC/ha for the thicket; and the carbon stock of the rubber land cover in the PPA Kemasul is 35.5 tonc/ha. In order to GHG mitigation in the new development plan, development scenario for each PPA were prepared. GHG mitigation for the PPA Kuala Gris involves a conservation land use plan as to preserve areas containing carbon stock including (its sequestration) and conservation values; while for the PPA Kemasul, it involves advanced in-mill management to improve carbon credit. In order to achieve successful GHG mitigation plan in the PPA, key activities of the mitigation plan for the Kuala Gris is focused to safeguard the conservation areas, while for the Kemasul is focused to ensure the utilization of the in-mill by products.

2. Scope of the Assessments

2.1. Organizational information/ contact person

Name of Company	:	Kuala Lumpur Kepong Bhd.
Status of Investment	:	Domestic Investment
Line of Business and Activity	:	Oil Palm Plantation and Refinery
RSPO Membership	:	RSPO member since 2004
Contact Person	:	**Lee Kuan Yee (kuanyee.lee@klk.com.my)** Senior Manager of Sustainability Department
Office Address	:	Wisma Taiko, 1, Jalan S.P. Seenivasagam, 30000 Ipoh, Perak Darul Ridzuan, Malaysia

2.2. List of legal document aspect, regulatory permit and property deed related to areas assessed

1. Geran 534, issued on December 23, 1998, Kuala Gris Estate of 1,846.00 ha
2. Geran 2188, issued on October 3, 1991, Kuala Gris Estate of 624.04 ha
3. Geran 6820, issued on August 19, 1998, Kemasul Estate of 461.01 ha

2.3. Location map

The oil palm plantation that will be developed are located in two different places. Administratively, the Kuala Gris Estate is located in Kuala Krai District, Kelantan State (Figure 1) and the Kemasul Estate is in Bera District, Pahang State (Figure 2). Both are located more than 10 km from protected areas. Map of protected areas in the wider landscape of the assessment area is presented in Figure 3.

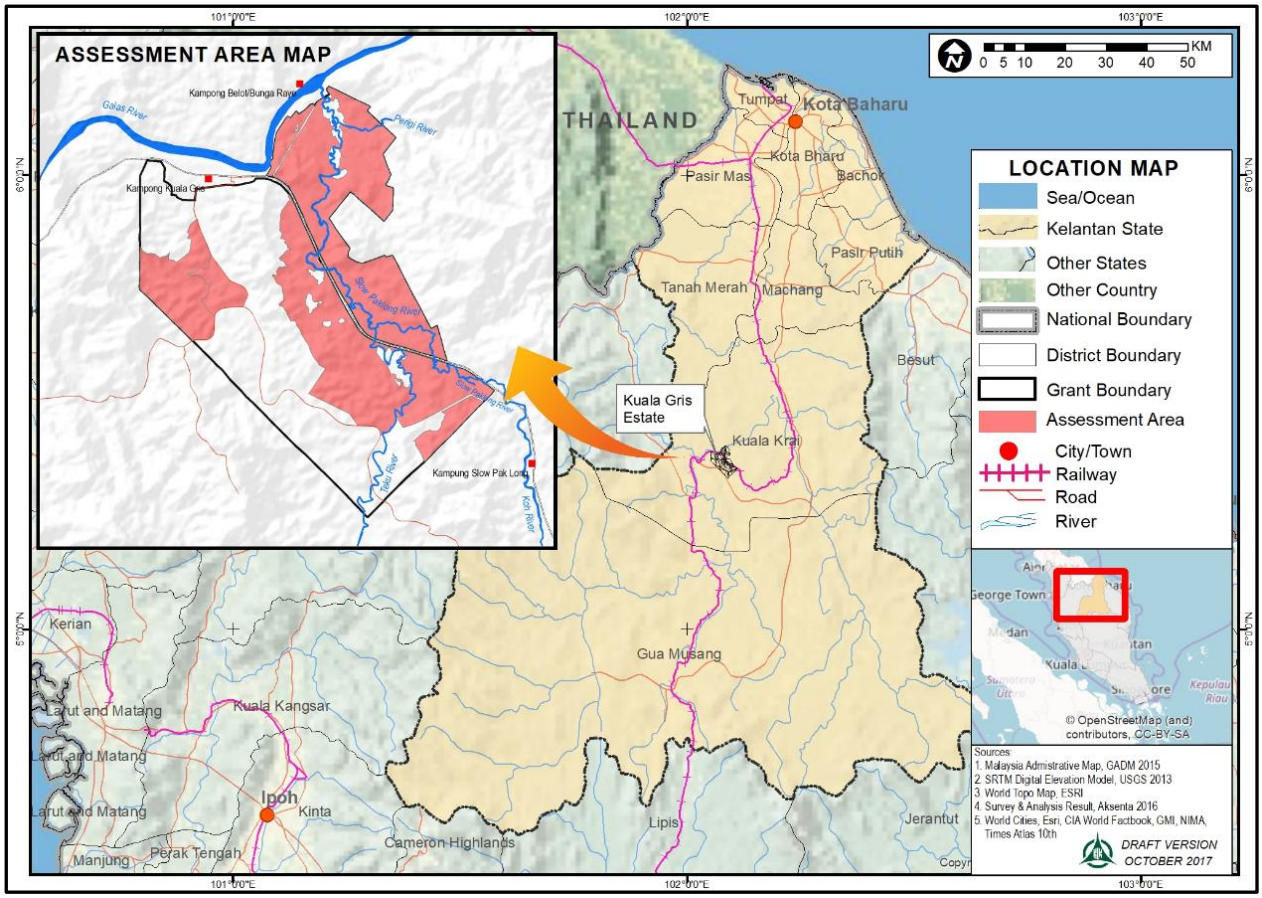


Figure 1. Situation Map of Kuala Gris Estate

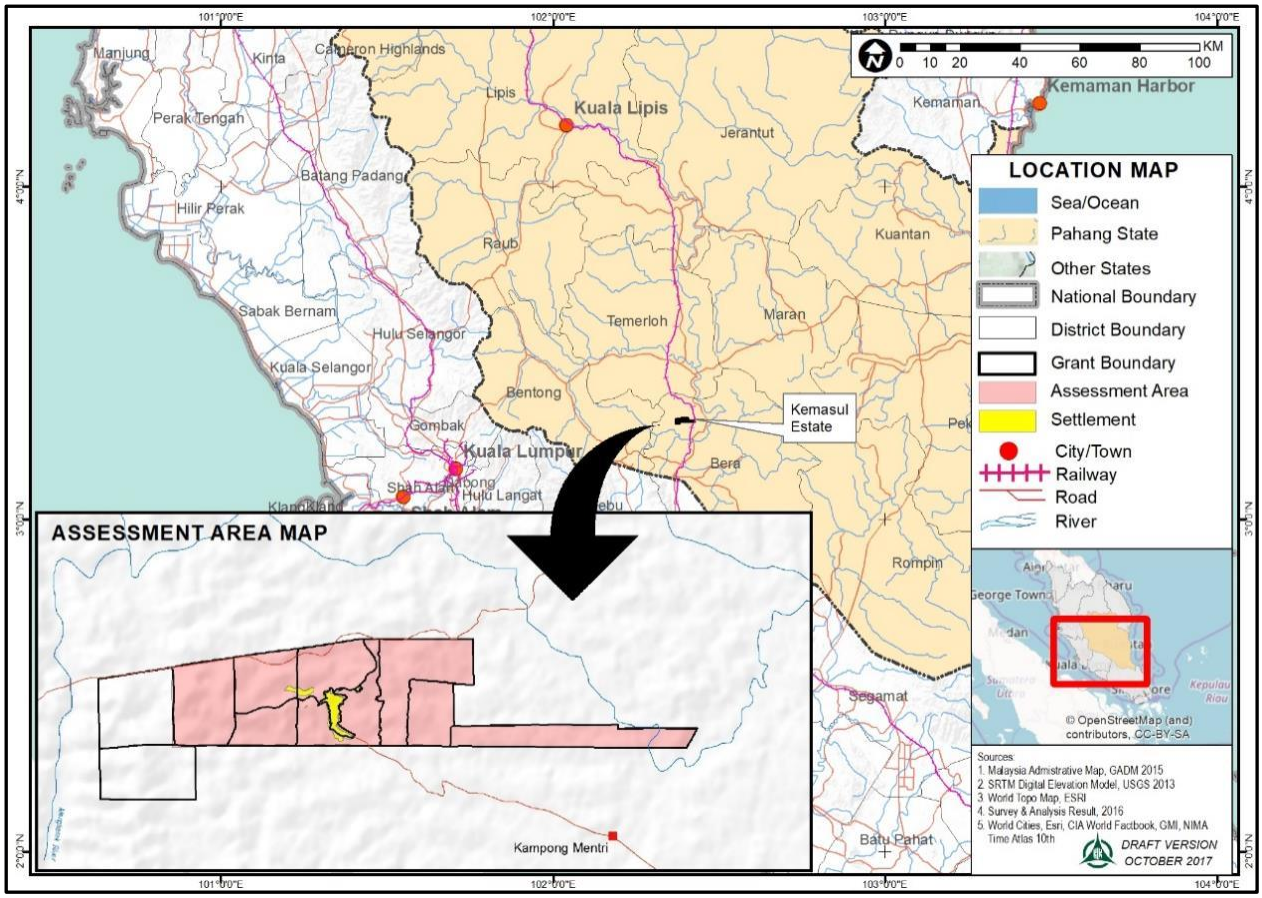


Figure 2. Situation Map of Kemasul Estate

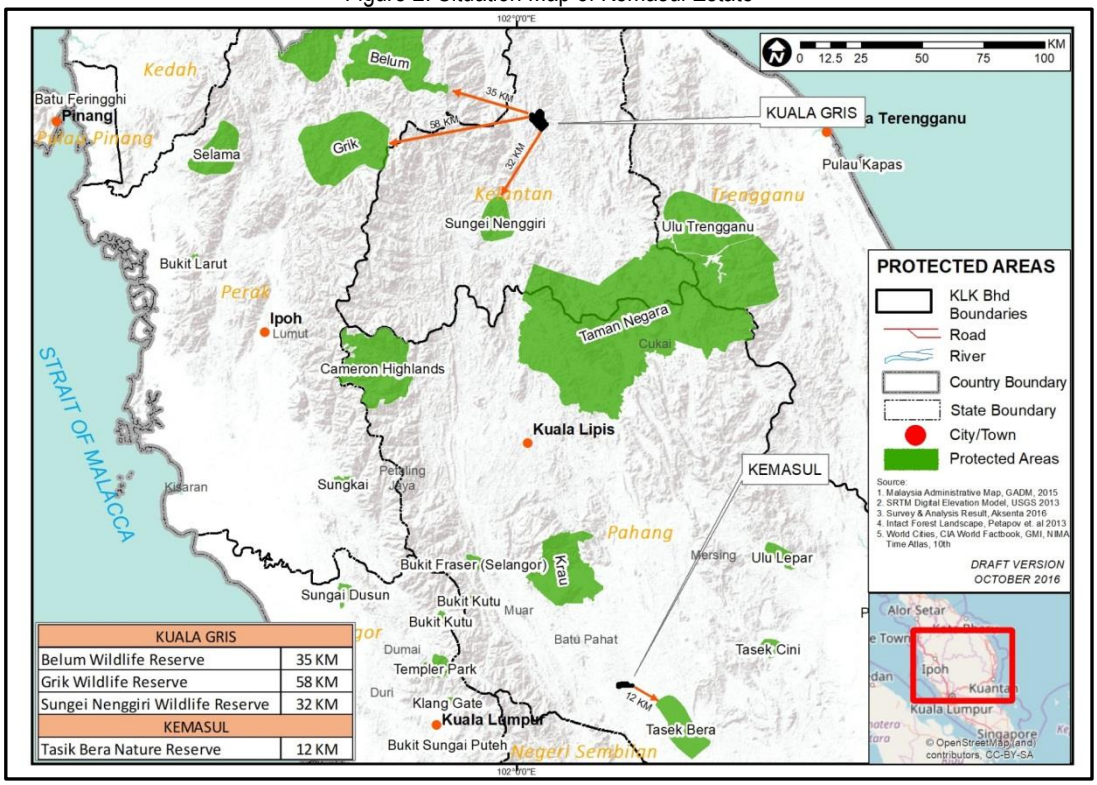


Figure 3. The map of the protected areas in the wider landscape

2.4. Area and time plan for new planting

The conversion from rubber plantation to oil palm plantation will be performed gradually in four years (table 1**Tabl**). This strategy has at least two advantages; internally it can avoid too much financial burden at one point of time and externally it can minimize negative impacts on the environment.

Table 1. Conversion Plan of Kemasul and Kuala Gris Estate

No	PPA	Plantation Block	Time plan of conversion from rubber to oil palm
1	Kemasul Estate	RM1992C	2019/2020
		RM1994A	2019/2020
		RM1997B	2019/2020
		RM1998A	2020/2021
		RM1999A	2020/2021
		RM2000A	2022/2023
		RM2002A	2022/2023
		RM2003A	2022/2023
2	Kuala Gris Estate	RM1988A	2019/2020
		RM1993A	2019/2020
		RM2000A	2019/2020
		RM1990A	2020/2021
		RM1990B	2020/2021
		RM1999A	2020/2021
		RM1991A	2021/2022
		RM1992A	2021/2022
		RM1997A	2023/2024
		RM1997D	2021/2022
		RM1998A	2023/2024
		RM1994A	2022/2023
		RM1995A	2024/2025
		RM1996A	2022/2023
		RM1996B	2024/2025
		RM1997B	2024/2025
		RM2006A	2025/2026
		RM2006B	2025/2026
		RM2007A	2025/2026

3. Assessment Process and Procedures

Field surveys of the assessments for the NPP of the PPA of Kuala Gris Estate and Kemasul Estate were carried on in a same period in 2016. However, details of the timelines which include preparation, analysis, and reporting between each assessment are different.

Reports of the assessments were finalized in 2016 and 2017. The assessments involved numbers of experts on particular expertise relevant to the assessment.

3.1. HCV (High Conservation Value) assessment

3.1.1. Dates conducted

HCV assessment was conducted from September 2016 to October 2017. Details of the timeline of the assessment is presented in table 2.

Table 2. Timeline of the HCV Assessment

Date	Main Activity
10 September – 16 October 2016	Desk study
17-18 October 2016	Preparation and planning
21-22 October 2016	Scooping study
23 October - 1 November, 2016	Field Survey: • Biodiversity survey • Ecosystem and environment survey • Socio-culture survey (stakeholder consultation)
3-25 November 2016	Data Analysis and prepare draft of report
28-30 October 2016	Stakeholders consultation with: • Communication with experts such as TRAFFIC SEA and Puta Malaysia University
December 2016 to October 2017	Data analysis and reporting

3.1.2. Assessors and their credentials

HCV assessment of KLK were conducted by Aksenta, which office is located at Jl. Gandaria VIII/10, Kebayoran Baru, Jakarta 12130; Telephone/fax: +62 21 739-6518, E-mail: aksenta@aksenta.com. The team of assessors, who has been approved by the RSPO, consists of eight members:

Table 3. Team of the HCV assessment

Name	ALS Licence	Institution	Role	Expertise
Nandang Mulyana nandangm73@gmail.com	Provisional (ALS15037NM)	Independent consultant	Team leader, socio-cultural study (HCV5 -6)	Social and cultural science
Setiawan Iwan Iwansti69@yahoo.com	N/A	Independent consultant	Team member. Field: biodiversity assessment (HCV 1-3)	Wildlife research and survey, wildlife management, ornithologist, facilitator for community biodiversity assessment.
Ikhwan Agustian Ikhwan@gmail.com	N/A	Independent consultant	Team member. Field: biodiversity assessment (HCV 1-3)	Vegetation research and survey.
Fersely Getsemani getsafeliggi@yahoo.com	N/A	Independent consultant	Team member. Field: environmental service (HCV 4)	Hydrologist, soil conservation, spatial analysis and remote sensing, water management system.
T Adhe Fachlevi adhefachlevi@hotmail.com	N/A	Independent consultant	Team member. Field: socio-cultural	Social and cultural science

Name	ALS Licence	Institution	Role	Expertise
			assessment (HCV 5-6)	
Ryan Karida Pratama ryan1988@indo.net.id	N/A	Independent consultant	Team member. GIS specialist.	Spatial analysis and remote sensing.
Pramitama Bayu Saputro Bayupitama87@yahoo.com	N/A	Independent consultant	Team member. Field: biodiversity assessment (HCV 1-3)	Wildlife research and survey, wildlife management, herpetologist and ornithologist.
M. Ahda Agung Arifian arifian.agung@gmail.com	N/A	Independent consultant	Team member. Field: biodiversity assessment (HCV 1-3)	Vegetation research and survey.
Yanto Ardianto yanto54321@hotmail.com	N/A	Independent consultant	Team member. Field: environmental assessment (HCV 4)	Hydrologist, soil conservation, spatial analysis and remote sensing, water management system.
Miranty Magetsari agetmaget@hotmail.com	N/a	Independent consultant	Team member. Field: socio-cultural aspects (HCV 5-6)	Social and cultural science
Muhamad Juan Ardha juanmardha@yahoo.com	N/A	Independent consultant	Team member. GIS specialist.	Spatial analysis and remote sensing.

3.1.3. Assessment method

The assessment process involves a desktop study and analysis on secondary data in the pre-assessment stage; and primary data collection, analysis, and reporting during the assessment stage.

Secondary Data

Results of the desktop study includes land cover map, topographical data, soil map, rainfall data, key species, map of ecosystems and habitats, social issues, general social and cultural condition.

The land cover history and the current land cover are interpreted from satellite imagery, in accordance with the RSPO RaCP (2015). Topographical data are analyzed from The Digital Elevation Model ("DEM") have made by the Shuttle Radar Topography Mission ("SRTM"). Map of ecosystems and habitats data are analyzed from ecoregion map (WWF, 2010) and lands system map. The data of species, social issues, social and cultural data are collected from literature and other key references (Table 4).

Table 4. References used in the assessment process

Sources of data and information	HCV					
	1	2	3	4	5	6
Information exchange from organisation requesting the HCV assessment						
Location map of Project Proposed Area/assessment area, KLK Bhd. 2016	✓	✓	✓	✓	✓	✓
Operational data of Project Proposed Area, KLK Bhd. 2016	✓	✓	✓	✓	✓	✓
Spatial data of operational planning in Project Proposed Area, KLK Bhd. 2016	✓	✓	✓	✓		
Rainfall data of Project Proposed Area, KLK Bhd. 2016				✓		
Information gathering for desktop study						
Map of Protected Forests in Peninsular Malaysia, Perhilitan/DWNP. 2016	✓	✓	✓			
Map of HCVF in Peninsular Malaysia (WWF Malaysia, 2009)	✓	✓	✓	✓	✓	✓

Spatial data oil palm plantation, Global Forest Watch. 2016						
Key types of information for desktop study						
Red list of Mammals for Peninsular Malaysia, DWNP. 2010	✓					
IUCN Red List of Threatened Species. *www.iucnredlist.org*, 2016	✓		✓			
Appendices I, II and III, valid from April 14, 2014 (CITES, 2014)	✓		✓			
Important Bird Areas in Asia: Key Sites for Conservation (Birdlife International, 2004)	✓					
Endemic Bird Area Factsheet: Malay Peninsula (BirdLife International, 2012)	✓					
Ramsar site in Peninsular Malaysia, source: *http://www.ramsar.org*, 2016	✓					
Intact Forest Landscape Map 2013 (downloaded at: www.intactforest.org)		✓				
Landsat 8 image (USGS, 2016), Quick Bird Image (google-earth, 2016)	✓	✓	✓	✓		
Shuttle Radar Topography Mission Elevation Data (USGS, 2004)				✓		
Land map review in 1:500.00 scale, ISRIC-Wegeningan, 1968.				✓		
Map of altitude (processing result based on SRTM[i] data), 2016				✓		
Map of watershed borders, processing result of SRTM data, 2016				✓		
Map of slope class (processing result based on DEM SRTM data), 2016[1]				✓		
Map of Land Cover (based on Landsat 8 image, August & September 2016).				✓		
Distribution of indigenous people in Peninsular Malaysia (Department of Indigenous People Development-JAKOA, 2016)					✓	✓
Statistic of Kelantan State (Department of Statistic Malaysia 2010)						
Statistic of Pahang State (Department of Statistic Malaysia 2010)					✓	✓
Present situation and problems faced by the *orang asli* (www.lucy.ukc.uc, 2016)					✓	✓

Field data collection

Primary data collection for HCV assessment using rapid assessment technique with ground truthing, field observation, field visit with local communities and stakeholder consultation. The output data for assessment is qualitative, no attempt was made to gather any further quantitative data.

The survey design for biodiversity and environmental using purposive sampling and area sampling, while survey design for social using purposive sampling and snowball sampling. The purposive sampling and area sampling in biodiversity and environmental survey based on satelite imagery interpretation, usually focus on forest, degraded forest, non-forest area, open areas, plantation areas, wetlands, swamps, streams, riparian buffers, rivers and hilly area.

The purposive sampling and snowball sampling in social survey based on the need of data from respondents who fulfill the following requirements, namely: (1) communities who use natural resources in the assessment area, (2) local stakeholders who interact with the natural resources in the assessment area, (3) communities who use these natural resources in a traditional manner, and (4) the social, economic and customary conditions of these communities in the assessment area.

The observation points were determined through land cover maps and stakeholder consultations. The number of observation points to identify HCV 1-4 in the assessment area of Kuala Gris Estate was 50 points (19 points inside the concession, and 31 points in the surrounding landscape), and in Kemasul Estate totals 39 points (17 points inside the concession, and 22 points in the surrounding landscape), please note that Kuala Gris Estate consists of 95% Rubber plantation, and Kemasul Estate consists of 100% Rubber plantation. The observation points in the assessment area represented all land cover types. Three village located near the assessment area in Kuala Gris Estate were surveyed and one village located near the assessment area in Kemasul Estate were surveyed (see **Figure 4**). The total of informants in stakeholder consultations is 47 people, consisting of village chiefs,

[1]Shutlle Radar Topographic Mission, is a mission or project of NASA with NGA to obtain elevation data in global scale. This mission was carried out for 11 days in February 2000. The main product resulted is DEM (Digital Elevation Model).

communities leaders/important figure of the local community, NGOs, researchers, plantation management and local workers. This disadvantage of this sampling method of the assessment is that it cannot produce qualitative data or statistically testable results.

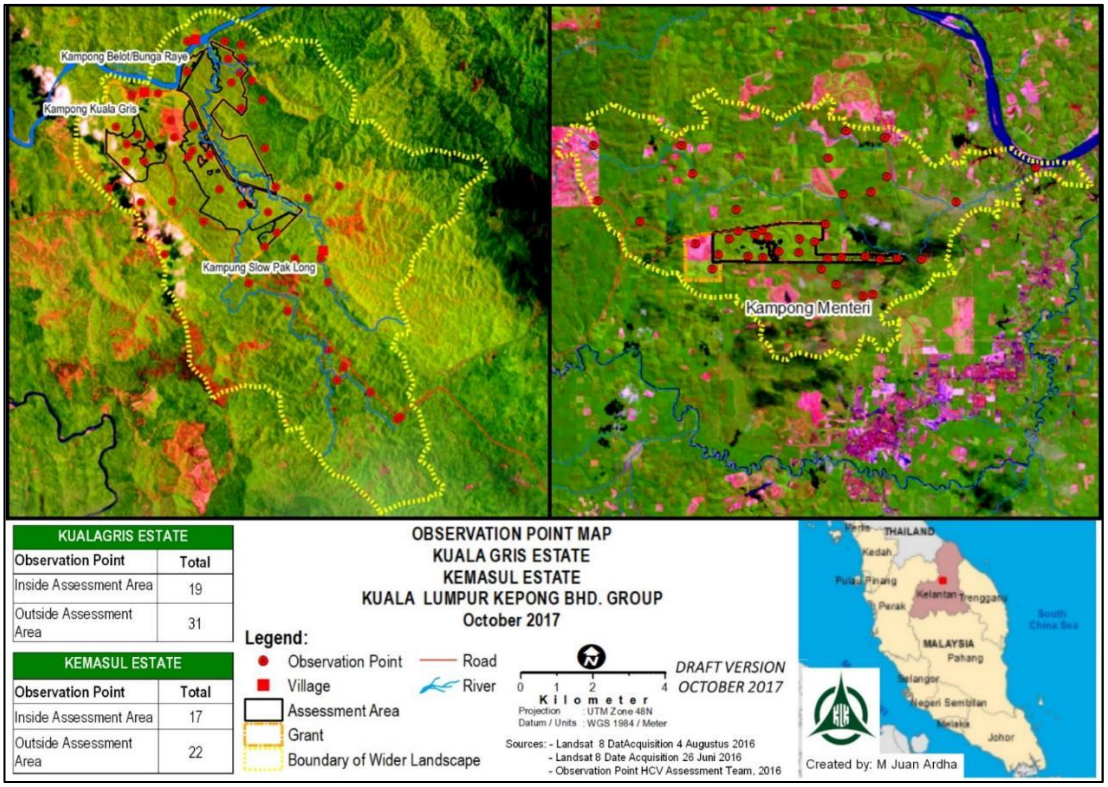


Figure 4. Map of observation points in the HCV Assessment

HCV 1: Species Diversity

Fauna Survey

The survey of mammals using (i) assessment of habitat quality (in combination with the botany study), (ii) direct (visual) and indirect sightings techniques (foot prints, calls, faeces, scratch marks) whilst undertaking habitat assessments, (ii) un/structured interviews with local communities.

The bird surveys were conducted at different times during the day, typically from half an hour after sunrise to half an hour before sunset. Tropical forest raptors are difficult to see inside the forest, so can be best seen during periods of strong thermal activity. The survey of bird using surveys techniques from (i) vantage points (hill tops, along ridges, in forest openings and along forest edges, and searching the sky and canopy), (ii) opportunistic observations during the survey (sightings from motorcycles and cars, from the upper deck of riverboats, and occasionally from longboats or motorized canoes), (iii) surveying for birds perching in dead trees or on tree stumps (easily seen and identified from a large distance), (iv) interviews with local hunters, (v) assessment of habitat quality (in combination with the botany study), and (vi) direct (visual) and indirect (nests and calls) sightings whilst undertaking habitat assessments.

The survey of reptiles and amphibians using (i) visual encounter survey, (ii) opportunistic observations during the survey, (iii) interviews with local communities, (iv) assessment of habitat quality (in combination with the botany team), (v) night surveys along waterbodies for

frogs, (vi) collection and identification of roadkills, and (vii) direct (visual) and indirect (voice) sightings whilst undertaking habitat assessments.

Flora surveys

Plant surveys are qualitative observations of several indicators or proxy indicators, focusing on (i) vegetation structure and composition (e.g. using canopy structure proxy and dominant plant species for forest ecosystem, (ii) succession phases that occur (for forest ecosystem, e.g. using climax or secondary classifications, using succession phase-marking plant species as the proxy and description of conditions within an area or under stands/canopy); and (iii) ecosystem quality or condition (differed between intact and relatively intact or slightly disturbed, disturbed, degraded and severely degraded).

HCV 2: Landscape, Ecosystem Mosaics and Intact Forest Landscapes

Identification of HCV 2 is based on the result of botanical surveys in combination with spatial analysis. HCV 2 analysis and identification are referring to the Map of concession area (assessment area), Map of Protected Areas/protected areas list, Land Cover: Landsat Satellite Imagery 8 OLI, and the Intact Forest Landscape Map. Some coordinate points are placed at the predefined HCV attributes or elements then mapped onto the work map. Thus, such information of location where the HCV attributes or elements found, are used to such location for similarity area identification referring to landsat satellite imagery interpretation result. Similar field characteristics of HCV 2, as determined of wide landscape, such as land cover, similar ecosystem types (for instance dense forest, secondary forest, shrubs, rubber forest, lakes, rivers, swamps) which are then digitized on a work map. The resulting polygons from the digitations process are used to designate the indicative boundaries of the HCV area.

HCV 3: Ecosystems and Habitats

The identification of HCV 3 areas is based on data compiling and combining of botanical surveys, satellite imagery analysis and soil analysis (both type and characteristics). Observations are made regarding the vegetation cover such as primary forest, secondary forest and shrubs, and the ecosystem types identified from the desktop study. Then, such data are interpreted and digitized on a work map to create polygons of indicative HCV 3 areas. The polygons of indicative HCV 3 areas area then further discussed to find solid justification whether or not these areas fulfill the requirements of HCV 3. The assessment is aimed at rare, threatened, or endangered ecosystem, species habitats or refugia in the study area.

HCV 4: Ecosystem Services

The survey of ecosystem services using ground truthing techniques and field observation. Every assessment object recorded must be supplemented with: (i) toponym,[2] (ii) site description, (iii) current status (such as area condition, land use type and intensity), (iv) threats and potential threats, (v) coordinates, and (vi) documentation in the form of photographs of field conditions. To enrich the inputs for analysis and improve the understanding on the assessed sites and the assessment area in general, information was also gathered through selected respondents using triangulation process (combining with semi-structured interview/FGD with local communities). Identification of ecosystem services (HCV 4) using field guidance.

[2] Scientific language used for the name of a place, origin, definition, use, and typology. The first part of the word comes from the Greek word *tópos* (τόπος) meaning "place" followed by *ónoma* (ὄνομα) meaning name. Toponymy is part of onomastics, discussion on various names. A toponymy is the name of a place, area, or part of the Earth's surface, including natural (for example, rivers) and man-made locations.

HCV 5: Community Needs

Community needs are identified together with the local communities using the 'Free, Prior and Informed Consent' (FPIC) approach. The FPIC process is carried out by using the following guidance: Free, Prior and Informed Consent Guide for RSPO Members (Colchester *et.al*, 2015) and FSC Guidelines for the Implementation of The Right to Free, Prior and Informed Consent (Vlist & Richert, 2012).

The survey of community needs using participatory mapping, Focus Group Discussion (FGD) and semi-structured interviews with stakeholder. The process of data collecting using key questions. The results of all meetings were openly noted on flipchart paper and questions often repeated or crosschecked to confirm understanding of questions and answers given. If the communities were dependent on forest/natural resources in the landscape, participative sketch mapping was used to illustrate location of HCV areas. After data collecting, together with the local communities visit to the field for documentation by taking GPS coordinates and photographs, site description, current status, threats and potential threats.

HCV 6: Cultural Values

The methods used to identify cultural value same methods used to identify community need (HCV 5). However, there is a difference key questions used to identify cultural values (HCV 6), detail of key questions to identify HCV 6.

Threat Assessment

The approach used in this threat assessment is the "5-S Framework" and the Participatory Conservation Planning developed by The Nature Conservancy (TNC). This threat analysis compares declining conservation values against "critical degradation", with Stresses (symptoms or proximal cause, such as population reduction), and Sources (causes to stress, such as hunting; Stewart *et al*., 2008).

Stakeholder Consultation

Consultation was done using three approaches, namely direct consultations at the location, consultation via emails, and meetings with NGO in Kuala Lumpur. Stakeholders were grouped based on their relationship to and interest in the assessment area and the assessed objects. The groups of stakeholders were identified, i.e. local communities, migrant communities (who have long inhabited the assessment area), management unit and environmental organisations and academicians (Table 5). Total of the informants in the stakeholder consultations is 47 people, consisting of village chiefs, leaders/important figure of the communities, NGOs, researchers, plantation management and local workers.

Table 5. References used in the assessment process

Stakeholder	Consultative Approach
Local communities: - Malayan ethnic community leaders (Kuala Gris Estate) - Chinese ethnic community leaders (Kemasul Estate) - Community members in general	- Consultations during survey (Interview, Participatory Mapping and Focus Group Discussion)
Local organisations and institutions - Village heads - Plantation management unit's management	- Consultations during survey (Interview, Participatory Mapping and Focus Group Discussion) - Presentation and interim output, followed by discussions and formal meeting in the villages
Environmental organisations and academicians/ researchers - National NGO - International NGO - University researchers	- Communications through email - Meetings in Kuala Lumpur

Data and Information Analysis and Mapping of HCV Area

Data gained from field data collection activity is compiled and tabulated based on the area where observation is carried out. In early phase, compilation and tabulation are conducted separately for each field of assessment (biodiversity, environmental services and socio-cultural aspects). For each area, a list is made containing HCV attributes or elements whose presence is already confirmed on the ground. This process continues with analysis to reinforce the justification of concluding whether or not HCV attributes or elements are found in the surveyed areas in order to delineate the HCVAs.

Coordinates of locations where HCV attributes or elements are found are mapped on the work map. Information on description of such locations is used to identify places in the area in question that in the field are characterized with similar features based on satellite image interpretation. Such similar field characteristics, in case of HCV 1-3 and HCV 5-6, take form of similar types of land cover or ecosystem (e.g. dense forest, secondary forest, scrub, lake, river or swamp). In case of HCV 4, similar field characteristics may take form of areas with steep slope, stream, riverbank, floodplain, bank of open water body, or depressed area (basin).

An indicative HCVA map is made for each field of assessment. Therefore, six maps will be produced, i.e. HCVA 1-6 map. These six maps will later on be combined into one single indicative HCVA map. Producing a definitive HCVA map requires delineation of the indicative HCVAs and taking on-site coordinates. Output of this delineation process will be mapped to revise the indicative HCVA boundaries produced from this HCV assessment.

3.2. Social and environmental impact assessment

3.2.1. Dates conducted

Table 6. Timeline of the SEIA assessment

Activity	Date	Place
Desk study	18-20 October 2016	Aksenta, Jakarta
Travel Jakarta - Kuala Lumpur	21 October 2016	Travel to study location
Kick-Off Meeting	22 October 2016	TQCC, Petaling Jaya
Field Survey	23 – 30 October 2016	proposed project area / PPA
Closing Meeting	2 November 2016	TQCC, Petaling Jaya

3.2.2. Assessors and their credentials

SEIA of KLK were conducted by Aksenta, which office is located at Jl. Gandaria VIII/10, Kebayoran Baru, Jakarta 12130; Telephone/fax: +62 21 739-6518, E-mail: aksenta@aksenta.com. The team of assessors, who has been approved by the RSPO, consists of eight members:

Table 7. Team of the SEIA assessment

Name	Expertise
Nandang Mulyana nandangm73@gmail.com	Social and cultural science
Setiawan Iwan Iwansti69@yahoo.com	Wildlife research and survey, wildlife management, ornithologist, facilitator for community biodiversity assessment.
Ikhwan Agustian Ikhwan@gmail.com	Vegetation research and survey.
Fersely Getsemani getsafeliggi@yahoo.com	Hydrologist, soil conservation, spatial analysis and remote sensing, water management system.
T Adhe Fachlevi adhefachlevi@hotmail.com	Social and cultural science
Ryan Karida Pratama ryan1988@indo.net.id	Spatial analysis and remote sensing.
Pramitama Bayu Saputro Bayupitama87@yahoo.com	Wildlife research and survey, wildlife management, herpetologist and ornithologist.
M. Ahda Agung Arifian arifian.agung@gmail.com	Vegetation research and survey.
Yanto Ardianto yanto54321@hotmail.com	Hydrologist, soil conservation, spatial analysis and remote sensing, water management system.
Miranty Magetsari agetmaget@hotmail.com	Social and cultural science
Muhamad Juan Ardha juanmardha@yahoo.com	Spatial analysis and remote sensing.

3.2.3. Assessment method

The SEIA was conducted in six stages, namely (i) document review, (ii) development of hypothetical impact, (iii) field survey, (iv) verification of the hypothetic based on results of the field survey, (v) analysis of the impacts, (vi) and preparation of the mitigation plan. Identification and analysis of the impacts were conducted based on the stages/activity of the conversion program, namely (i) preparation, (ii) construction/development (cutting and clearing of the rubber trees), and (iii) planting of oil palm. In each stage/activity of the conversion program, there are three components which are potentially affected by the impacts, namely (i) physical environment component, (ii) biological environment component, and (iii) social environment component.

Document review was conducted on relevant document (e.g. HCV assessment and review and update reports, soil and topographic map, SOPs, and other relevant documents). Potential impacts to the three components in the assessment area then were identified and verified based on the results of document review, field survey, analysis and verification of the impacts in each stage of the conversion program. Mitigation plans then were developed accordingly with the identified impacts from each stage of the conversion program.

3.3. Carbon stock assessment

3.3.1. Dates conducted

Study of Carbon Stock in study area took place from October to November of 2016. The study process was conducted in Jakarta, Indonesia and the study area in Peninsular Malaysia, Malaysia. Time and place of study is presented in table 8.

Table 8. Timeline of the carbon stock assessment

Team	Location	Date	Activity
All Team	**Jakarta**	October 15-19, 2016	**Desktop study and survey preparation**
All Team	**Jakarta – KL – PJ**	October 20, 2016	**Travel from Jakarta - KL – Kuantan**
All Team	**TQCC office**	October 21, 2016	Opening meeting, document review, focus group discussion (FGD) and participative mapping
2	**PJ – Kombok Estate**	October 22 - 24, 2016	Document review, field survey **focus group discussion (FGD) and interview with local communities, stakeholder consultation, discussion and data compilation**
1	**PJ – Kuala Gris Estate**		
1	**Kerilla –Pelam Estate**	October 24, 2016	
2	**Kombok – Voules Estate**	October 23, 2016	
1	**Pelam – Sungai Sokor Estate**	October 25, 2016	
2	**Voules – New Pogoh Estate**	October 24, 2016	
1	**Sungai Sokor – Pelam Estate**	October 27, 2016	
2	**New Pogoh –Jeram Padang Estate**	October 25, 2016	
1	**Pelam –Serapoh Estate**	October 28, 2016	
2	**Jeram Padang – Batang Jelai Estate**	October 26, 2016	
1	**Serapoh – Glenealy Estate**	October 28, 2016	
2	**Batang Jelai –Tuan Estate**	October 26, 2016	
1	**Glenealy – Pinji Estate**	October 29, 2016	
2	**Tuan - Sungai Kawang Estate**	October 27, 2016	
1	**Pinji – Changkat Asa Estate**	October 30, 2016	
2	**Sungai Kawang Kemasul Estate**	October 28, 2016	
2	**Bandar Bentong**	October 29-30, 2016	**Data compilation and analysis**
All Team	**Back To PJ**	October 30, 2016	
	PJ	October 31- November 1, 2016	**Discussion, data analysis, preparing interim report and presentation matters**
	TQCC, PJ	November 2, 2016	Closing Meeting
All Team	**Jakarta, Indonesia**	November- December 2016	Reporting of the carbon stock assessment
All Team	**Jakarta, Indonesia**	December 2016 – October 2017	Analysis and reporting of the GHG assessment

3.3.2. Assessors and their credentials

The Study of Carbon Stocks is conducted by a team from PT. Gagas Dinamiga Aksenta consisting of four members. Below are brief descriptions of the team members involved in the study.

Muhamad Fakhrul. Graduated from the Department of Geophysics and Meteorology, Faculty of Mathematics and Natural Science, Institut Pertanian Bogor (IPB). He is experienced in the field of GIS and Remote Sensing for the analysis of land cover change and prediction of meteorological parameters. He is experienced in conducting research and studies of forest area by using GIS and Remote Sensing. Starting his career by conducting study on wetland ecosystems. In the team, he acts as a GIS expert and Study of Below Ground Biomass. In this

Study, he serves as the coordinator of the first team and is responsible for data collection, spatial analysis and remote sensing.
Contact: fakhrul@aksenta.com
Ryan Karida Pratama. Expert of GIS and Remote Sensing. A Bachelor of Geophysics and Meteorology – Institut Pertanian Bogor is experienced in studies of land cover change, identification of the physical properties of soil by using remote sensing technology. Starting his career by conducting study on soil wetness index in forested areas on peat soils and mineral soils by using satellite imagery data. In this activity his responsibility is processing spatial data and remote sensing.
Contact: ryan1988@indo.net.id

Bias Berlio Pradyatma; Experienced in studies related to Carbon Stock Assessment, HCS Approach Practice, and Greenhouse Gas Assessment for New Planting. Graduated from the Department of Forest Resource and Ecotourism, Institut Pertanian Bogor with a Bachelor of Forestry. In this study, he acts as the coordinator of team 2 and responsible for compiling field data, analysis of vegetation and ecology.
Contact: bias@aksenta.com

Muhammad Juan Ardha. Having educational background of Forest Resources Conservation and Ecotourism, from the Faculty of Forestry, Istitut Pertanian Bogor. He is experienced in GIS and remote sensing techniques, particularly for natural resource management, and land use issues such as land use change analysis, land use planning and spatial database. In this study he is responsible in compiling field data and mapping.
Contact: juanmardha@yahoo.com

3.3.3. Assessment method

Carbon Stock Assessment
The study is conducted with reference to several available standard carbon inventory guidelines, i.e. Guidelines for National Greenhouse Gas Inventories (IPCC, 2006), Measurement and Calculation of Carbon Stock: Field Measurement for the assessment of forest carbon stock (Ground-based Forest Carbon Accounting) – SNI 7724 (2011), Carbon Assessment Tool for New Oil Palm Planting: Version 1 (RSPO, 2012) and Carbon Assessment Tool for New Oil Palm Plantings: Version 2 (RSPO, 2014).

The process of the Carbon Stock Study in the PPA is divided into four phases, namely (i) initial study, (ii) compiling data and taking field samples, (iii) data analysis and mapping, and (iv) drafting report. The flowchart of the activities and data used are presented in Figure 5.

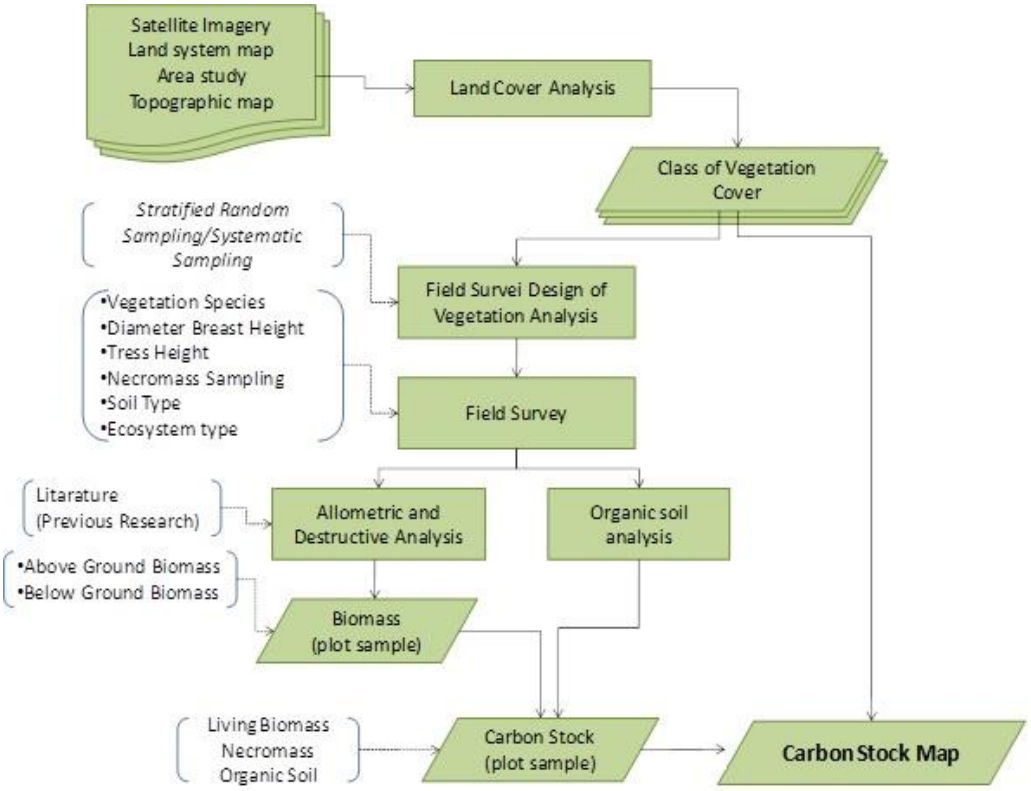


Figure 5. Methodology and phases of carbon stock inventory in the PPA

IPCC (2006) classifies carbon source into three main categories, namely (i) living biomass, (ii) dead organic matter and (iii) soil carbon (Liao c et al., 2010). Living Biomass consists of above ground biomass and below ground biomass. Whereas dead organic matter is divided into two parts, namely dead timber and litter. IPCC established the source of carbon in forest into five sections that need to be quantified in order to determine the value of carbon stocks. This is done to reduce emissions due to changes in land cover or vegetation. Table 8 shows the sources of carbon according to the IPCC (2006).

Table 9. Sources of carbon at land and forest (IPCC, 2006)

Carbon Pool		Description
Biomass	Above Ground Biomass	All biomass of vegetation above ground, including stems, stumps, branches, bark, leaf and fruit either in the form of a tree, bush or herb.[3]
	Below Ground Biomass	All biomass of living roots. Fine roots with a diameter less than 2 mm are often excluded from count, since it is difficult to distinguish from dead organic matter of soil and litter.
Dead organic material or debris	Dead timber	All dead timber biomass, whether its vertical, fallen or underground. Diameter greater than 10 cm.
	Litter	All dead biomass with the size > 2 mm and diameter less than 10 cm, fallen timber in varying degrees of decomposition.
Soil	Organic Matter of Soil	In case of mineral soil, calculation of organic matter includes soil depth of 0-60cm. For peat soil it is dependent on the depth of the soil. This includes root and fine litter with a diameter less than 2mm, because it is difficult to differentiate.

Secondary data assessment is the initial stage in the desk study intended to find information concerning the physical environment and ecology of study area and PPA. The desk study was

[3]Info: plants below the forest floor is relatively small and can be excluded from the calculation

also intended to assess the methods used to calculate carbon stock. Data and information required for this desk study is presented at table 9.

Table 10. List of reference data and information used in the carbon stock assessment

No	Types of Data and Information	Source
1	Landsat satellite imagery 8 OLI TIRS path/row 127/56 acquisition date 4 Agustus 2016 Landsat satellite imagery 8 OLI TIRS path/row 126/58 acquisition date 26 Juni 2016	www. Earthexplorer.gov NASA – USGS
2	Vector data (shp) of Base Maps of Malaysia	Anonymous
3	Vector data (shp) of basemaps of the Kuala Gris and Kemasul Estates and the PPAs	KLK
4	Data and map of soil types and topography within study area	KLK
5	Documents related to the size and density of the rubber trees in the PPA	KLK
6	Raster data of DEM90m (SRTM)	USGS
7	Carbon Assessment Tool for New Oil Palm Plantings (December 2012-ver 1)	RSPO
8	Biomass calculation: An introduction on the study of carbon stocks and carbon trading (Dandun Sutaryo, 2009)	Wetlands International Indonesia Programme 2009
9	Measurement of stored carbon in a wide variety of land use (Hairiah K, Rahayu S. 2007).	World Agroforestry Centre - ICRAF, SEA Regional Office, University of Brawijaya,
10	Other related libraries	

Initial studies consist of classifying land cover and design of field surveys. Classifying Land cover is conducted based on the different characteristics of the vegetation within the study area and identified through satellite imagery, spatial data of the company, and company documents; While the design of the survey is conducted based on the land cover classification to plan the activities in the field.

Land cover classification is conducted manually through the interpretation of satellite imagery and spatial data of the company. Horning (2004) states that there is method of classifying land cover automatically consisting of supervised classification, unsupervised classification, artificial neural net classification, binary decision tree classification, and image segmentation. Classifying manually is used as most study areas is covered by vegetation cover and a portion of the area covered by natural vegetation is an overlay with one type of land cover. With the available spatial data, accurate maps can be produced.

Classifying land cover is conducted to design field surveys and to calculate the amount of carbon stocks. Classifying vegetation density is conducted based on the density of individual plant density unit owned by the company. Documents used as source of data of plant density is Yield Statistics which are updated regularly every month.

Field survey is conducted throughout the PPA consisting of 76 Fields in 16 different Estates. The survey design is selected which include the characteristics of the data in each PPA. The density of plants data in the Yield Statistics document is used to calculate carbon stocks per hectare in each PPA.

Data collected in the field consists of DBH tree[4], diameter of dead timber and fallen timber, and weight of undergrowth and litter. Compiling data is conducted in each PPA with measurement provisions for each data, that DBH tree measurements are conducted based on the sampling intensity of 5% from the tree density in each PPA. Sampling intensity of 5% have been selected because the study is conducted on homogeneous stands (Van Laar and Akca, 2007). Data obtained from measuring DBH tree samples in each PPA and will then be used as a value estimation of the PPA carbon stocks. The amounts of samples in each PPA is determined by the following equation;

$$S = \frac{Principal\ amount\ in\ a\ planting\ block}{Planting\ block\ size} \times 5\%$$

Measurement of dead trees and fallen timber in plots of 10x10 m^2, and undergrowth weigh samples and litter in plots of 1x1m^2 (table 11).

Table 11. Information on plot size of biomass taking

Plot Size	Object of vegetation
1 x 1 meter^2	Herbs, bushes, litter and tree seedling with a diameter of 2-10 cm
10 x 10 meter^2	All dead trees or fallen timber

GHG Assessment

GHG Assessment was conducted accordingly with the RSPO GHG Assessment Procedure for New Plantings (2016). The procedure is involving a calculator to estimate a projection of GHG emissions according to components of the field and mill operations which are sources of GHG emissions. Components of field and mill operations to be calculated for the new planting in the PPA of Kuala Gris Estate and Kemasul Estate are referring to the existing operating plantations under the management unit under the KLK Group as the projections of the use of the components. Components of the operations which are calculated in the assessment are as follow:

a. Land use change
b. Fresh fruit bunch production
c. Field fuel
d. Development on peat soil
e. Fertilizer and N_2O
f. Conservation area sequestration
g. Crop sequestration
h. Mill operation (i.e. fuel use, OER and KER, POME management, use and management of electricity, and sales of kernel shell)

3.4. LUCA (land use change analysis)

3.4.1. Dates conducted

[4] *Diameter at Breast Height* (DBH) is a standard measurement of the diameter of the central trunk. Measurements were taken at breast height, or around 1.3m from ground level.

The LUCA in the PPA of Kuala Gris Estate and PPA of Kemasul Estate was conducted between October 2016 and February 2017. The period consists of preliminary desktop study between 10 and 17 October 2016, field visit between 20 October and 2 November 2016, and analysis and reporting until February 2017.

3.4.2. Assessors and their credentials

Muhamad Fakhrul. Graduated from the Department of Geophysics and Meteorology, Faculty of Mathematics and Natural Science, Institut Pertanian Bogor (IPB). He is experienced in the field of GIS and Remote Sensing for the analysis of land cover change and prediction of meteorological parameters. He is experienced in conducting research and studies of forest area by using GIS and Remote Sensing. Starting his career by conducting study on wetland ecosystems. In the team, he acts as a GIS expert and Study of Below Ground Biomass. In this Study, he serves as the coordinator of the first team and is responsible for data collection, spatial analysis and remote sensing.
Contact: fakhrul@aksenta.com

Ryan Karida Pratama. Expert of GIS and Remote Sensing. A Bachelor of Geophysics and Meteorology – Institut Pertanian Bogor is experienced in studies of land cover change, identification of the physical properties of soil by using remote sensing technology. Starting his career by conducting study on soil wetness index in forested areas on peat soils and mineral soils by using satellite imagery data. In this activity his responsibility is processing spatial data and remote sensing.
Contact: ryan1988@indo.net.id

Bias Berlio Pradyatma; Experienced in studies related to Carbon Stock Assessment, HCS Approach Practice, and Greenhouse Gas Assessment for New Planting. Graduated from the Department of Forest Resource and Ecotourism, Institut Pertanian Bogor with a Bachelor of Forestry. In this study, he acts as the coordinator of team 2 and responsible for compiling field data, analysis of vegetation and ecology.
Contact: bias@aksenta.com

Muhammad Juan Ardha. Having educational background of Forest Resources Conservation and Ecotourism, from the Faculty of Forestry, Institut Pertanian Bogor. He is experienced in GIS and remote sensing techniques, particularly for natural resource management, and land use issues such as land use change analysis, land use planning and spatial database. In this study he is responsible in compiling field data and mapping.
Contact: juanmardha@yahoo.com

3.4.3. Assessment method

The LUCA was conducted accordingly with the RSPO Remediation and Compensation Procedures (2015), which includes relevant cut-off dates to identify land clearance prior to HCV Assessment and the NPP completion. The LUCA for PPA of Kuala Gris Estate and the Kemasul Estate consists of the four cut off dates and additional recent cut off dates, namely between (i) the November 2005 and the November 2007, (ii) the November 2007 and the December 2009, (iii) the January 2010 and the May 2014, and (iv) the May 2014 and the HCV assessment in November 2016; and the additional recent cut off dates between the HCV assessment in November 2016 and submission of the NPP in December 2018 (table 12).

Table 12. Date of satellite image acquisition

2.2. Date of satellite image acquisition for each time of clearance period				
Cut-Off Date	**Date of acquisition**		**Cloud cover (%)**	
	Kuala Gris	**Kemasul**	**Kuala Gris**	**Kemasul**
Before November 1, 2005 (DDMMYY)	22-10-2004	11-07-2004	0	< 10
November 1, 2005 (DDMMYY)	10-11-2005	10-11-2005	0	0
November 31, 2007 (DDMMYY)	13-09-2007	02-06-2007	<5	0
December 31, 2009 (DDMMYY)	17-08-2009	17-01-2010	<5	<10
May 9, 2014 (DDMMYY)	11-05-2014	20-05-2014	<5	<5
After HCV areas identified	-	-	-	-
After becoming RSPO member	22-10-2004	11-07-2004	0	< 10
After the management unit acquired (if relevant)	-	-	-	-
Latest satellite image used for ground truthing	28-08-2016	26-06-2016	< 5	0
Recent satellite imagery at time of the NPP submission	27-09-2018	25-12-2018	< 5	0
Satellite images used in the assessment				
Satellite name	Landsat Satellite Imagery 5 TM, 7 ETM+, 8 OLI			
Resolution	30 m			

The methodology of the LUCA involved a set of remote sensing and spatial analysis conducted on desk with GIS software, and ground truthing/field verification. Preliminary desktop analysis was conducted to derive initial data of historical land use change to design a survey and to be verified in the field. Field verification was carried out in 43 observation points which is derived from the Taro Yamane sampling method. Image validation and accuracy assessment then were conducted with data and information from the field verification. Identification of remediation and compensation liabilities then were conducted based on the verified historical land use change with GIS software accordingly with the RSPO RaCP (2015). Image analysis is conducted through object based visual interpretation.

3.5. FPIC study

Data and information relevant with the FPIC study is extracted from the reports of HCV assessment, SEIA assessment, SIA assessment, and social liability assessment. The estates where the study area is located are designated and managed as agricultural concession since before 1950. They are entitled for agricultural business and authorized to plantation companies. The information is confirmed by the land title documents and by a consultation with the stakeholders which include the local community living near to the study area. Therefore, FPIC study to on land acquisition from the community is not relevant for the study area.

3.6. Soil and topographic assessment

The assessment of soil and topographic is based on the existing information, mainly maps of soil type and contour lines in the both estates. The objective of this assessment is to identify fragile soil or places that need to be protected

4 Summary of Assessments

4.1. HCV (High Conservation Value) assessment

HCV Findings

Results from field observation and analysis have shown that there are only 2 HCV types found in the study area. Those HCV types are HCV 1, HCV 4 and potential HCV 2. HCV 1 consists of concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels. HCV 4 consists of basic ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes. The potential HCV 2 consists of secondary forest outside grand of Kuala Gris Estate, this area overlapping with the Cental Forest Spine Map (CFS) and Tiger Conservation Landscape (TCL). Meanwhile, HCV 3, HCV 5, and HCV 6 are not found in the study area. Relevant description and characteristics of the study area to determine the presence of HCV areas are briefly given in **Table 5.1** and **Table 5.2**

Table 5.1. Brief description of attributes and characteristics to determine the presence of HCV areas in Kuala Gris Estate

		Brief description and justification		
HCV	Definition	Present	Potential	Absent
1	Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are signifcant at global, regional or national levels	IUCN RedList species are found (i.e. Oriental Small-claw Otter, Malayan box Turtle Asiatic Softshelled Turtle) in Kuala Gris Estate	-	-
2	Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance	-	Kuala Gris Estate has no overlap with the Intact Forest Landscape. It does overlap with the Cental Forest Spine Map (CFS) and Tiger Conservation Landscape (TCL) of Peninsular Malaysia, but does not fulfil the criteria, as it has been completely developed 75 years before the CFS and TCL was initiated. The HCV 2 found outside boundary in assessment area (in boundary of wider landscape)	-

3	Rare, threatened, or endangered ecosystems, habitats or refugia	-	-	Lowland forest ecosystems have degraded 75 years ago in Kuala Gris Estate
4	Basic ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes	Teku, Koh, Slowpoklong, and Perigi Rivers in Kuala Gris Estate	-	-
5	Sites and resources fundamental for satisfying the basic needs of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples	-	-	• The local communities surrounding the study area are modern Malays, and are not traditional people, who extract their basic necessities from nature. • Basic needs of carbohydrates and animal protein are purchased. • Basic infrastructure is adequately provided to access healthcare, education, and economic centers.
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 local communities or indigenous people	-	-	• Ethnicities and cultures around the study area are heterogenic. Thus, customs being practiced have been influenced by religious beliefs. • There are no custom ceremonies or ritual, which require cultural, religious or sacred site, being practiced by the locals

Table 5.2. Brief description of attributes and characteristics to determine the presence of HCV areas in Kemasul Estate

		Brief description and justification		
HCV	**Definition**	**Present**	**Potential**	**Absent**
1	Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are signifcant at global, regional or national levels	-	-	There are no endangered species in Kemasul Estate

2	Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance	-	-	Kemasul Estate has no overlap with the IFL, TCL or CFP landscapes of Peninsular Malaysia
3	Rare, threatened, or endangered ecosystems, habitats or refugia	-	-	Lowland forest ecosystems have degraded 75 years ago in Kemasul Estate
4	Basic ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes	-	-	There are no rivers in Kemasul estate
5	Sites and resources fundamental for satisfying the basic needs of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples	-	-	• The local communities surrounding the study area are modern Malays, and are not traditional people, who extract their basic necessities from nature. • Basic needs of carbohydrates and animal protein are purchased. • Basic infrastructure is adequately provided to access healthcare, education, and economic centers.
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 local communities or indigenous people	-	-	• Ethnicities and cultures around the study area are heterogenic. Thus, customs being practiced have been influenced by religious beliefs. • There are no custom ceremonies or ritual, which require cultural, religious or sacred site, being practiced by the locals

4.1.1 HCV Outcomes and Justification

HCV 1: Species Diversity

HCV 1 area presence is characterised with the presence of areas of significant concentration of biodiversity including endemic and RTE species at global, regional or national level. Some small parts of the assessment area of Kuala Gris Estate are still indicated to have several RTE species.

Several conditions presented in **Table 5.3** below can be used to indicate the presence of HCV 1 (Brown *et al.*, 2013). According to the assessment output, it is evident that HCV 1 requirements are met in Kuala Gris Estate, but not in Kemasul Estate.

Table 5.3. Summary of conditions that may indicate the presence of HCV 1 in the assessment area

Indicators that qualify as HCV 1	Assessment area	
	Kuala Gris Estate	Kemasul Estate
A high overall species richness, diversity or uniqueness	-	-
Population of multiple endemic or RTE species	-	-
Important population of individual endemic or RTE species	-	-
Small populations of individual endemic or RTE species that is critically dependent on the area	-	-

Sites with significant RTE species richness, or population (incl. temporary concentration)	✓	-
Particularly important genetic variants	-	-

Note: ✓ = present; - = absent, *= potential

The assessment area is situated in an environment that has already been developed 90 years ago for rubber plantations. Its location is near to community settlements with open road access. The local environment surrounding the assessment area consists of oil palm plantations, making it no longer part of a natural landscape. The assessment area was once a lowland forest ecosystem, but it has undergone severe degradation as a result of timber extraction, land clearing for farmland, and (forest) fires. The remaining natural ecosystem presently consists of bushes and shrubs.

During field studies, 10 species of Mammals were recorded. One of which is classified as Vulnerable, namely the Oriental Small-clawed Otter (*Aonyx cinereus*), while 4 species are listed on Appendix II of CITES, 2 as Totally Protected and 5 as Protected by Wildlife Conservation Act 716 of 2010.

As many as 51 species of birds have been recorded, three of which are listed as CITES Appendix II and 33 as Totally Protected and 6 as Protected under the Wildlife Conservation Act 716 of 2010.

A total of 12 species of herpetofauna (reptiles and amphibians) were recorded, 2 out of which are classified as Vulnerable, i.e. the Malayan Box Turtle (*Cuora amboinensis*) and the Asiatic Softshell Turtle (*Amyda cartilaginea*), 3 of which are listed as CITES Appendix II and 5 others protected by the Wildlife Conservation Act 716 of 2010.

In total, only 7 plant species were recorded in the transects, namely *Malotus sp, Melastoma malabathiricum, Macaranga bancana, Trena orientalis, Vitex pinnata, Syzigium* sp. *and Shorea* sp. Most of these are pioneer species. No plant species with endangered status and protected by protection by the Wildlife Conservation Act (No. 716, 2010).

Mammal species which are Protected or Totally Protected under the Wildlife Conservation Act of 2010, but are not HCV species are: Banded Leaf Monkey (*Presbytis fermoralis*), Long-tailed Macaque (*Macaca fascicularis*), Leopard Cat (*Prionailurus bengalensis*), Eurasian Wild Pig (*Sus scrofa*), Malayan Porcupine (*Hystrix brachyura*), and Asian Palm-civet (*Paradoxurus hermaproditus*).

Therefore, the only three RTE species present in the assessment area are those listed as Vulnerable under the IUCN Redlist, namely: Oriental Small-clawed Otter (*Aonyx cinereus*), Malayan Box Turtle (*Cuora amboinensis*), and Asiatic Softshell Turtle (*Amyda cartilaginea*). All three species are aquatic and inhabit the rivers and riparian buffers of Kuala Gris Estate. Kemasul has no rivers flowing through the estate, and no RTE species.

The part of the Galas River that is adjacent to but outside of the Kuala Gris Estate boundary is identified as HCV 1. Though the riparian areas are covered with agricultural vegetation including plantation (oil palm), i.e. no natural vegetation whatsoever, the river itself harbours HCV 1 species. The riparian buffer of the Galas River also supports the habitat, breeding site or any other functions that support the continued existence of HCV 1 species.

The rivers and riparian buffers in Kuala Gris Estate can therefore be concluded as being sites with significant RTE species richness, or populations of priority species (**Table 5.4**, **Figure 5.1**).

Table 5.4. Locations HCV 1 areas in Kuala Gris Estate

ID	Location	HCV Element	Indicative Boundary	Area (ha)*
HCV Inside of Assessment Area (inside Grant of Kuala Gris Estate)				
01	Perigi River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	2.3
02	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	7.5
03	Slow Pok Long River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	0.6
04	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m (upstream) and 20 m (downstream) buffer along both sides of the river	55.2
05	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	1.8
Total Area of HCV (ha) inside assessment area				**67.4***
Area of Kuala Gris Estate (ha)				**1,357,1**
Percentage of HCV Area (%)				**4.96**
*) The total hectare includes all HCV areas in the estate (within and beyond the PPA). HCV areas found outside the PPA consist of (i) Riparian Buffer of Teku River (ID 04) and (ii) Riparian Buffer of Perigi River (ID 01). Both are included in the calculation as they are located within the estate boundary and therefore also part of the responsibility of the Management Unit.				
HCV Outside Assessment Area (outside Grant of Kuala Gris Estate)				
06	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	94.9
07	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	80.4
08	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m (upstream) and 20 m (downstream) buffer along both sides of the river	11.4

ID	Location	HCV Element	Indicative Boundary	Area (ha)*
Total Area of HCV (ha) outside of assessment area				186.7

Note: *) Estimate of area based on GIS calculation

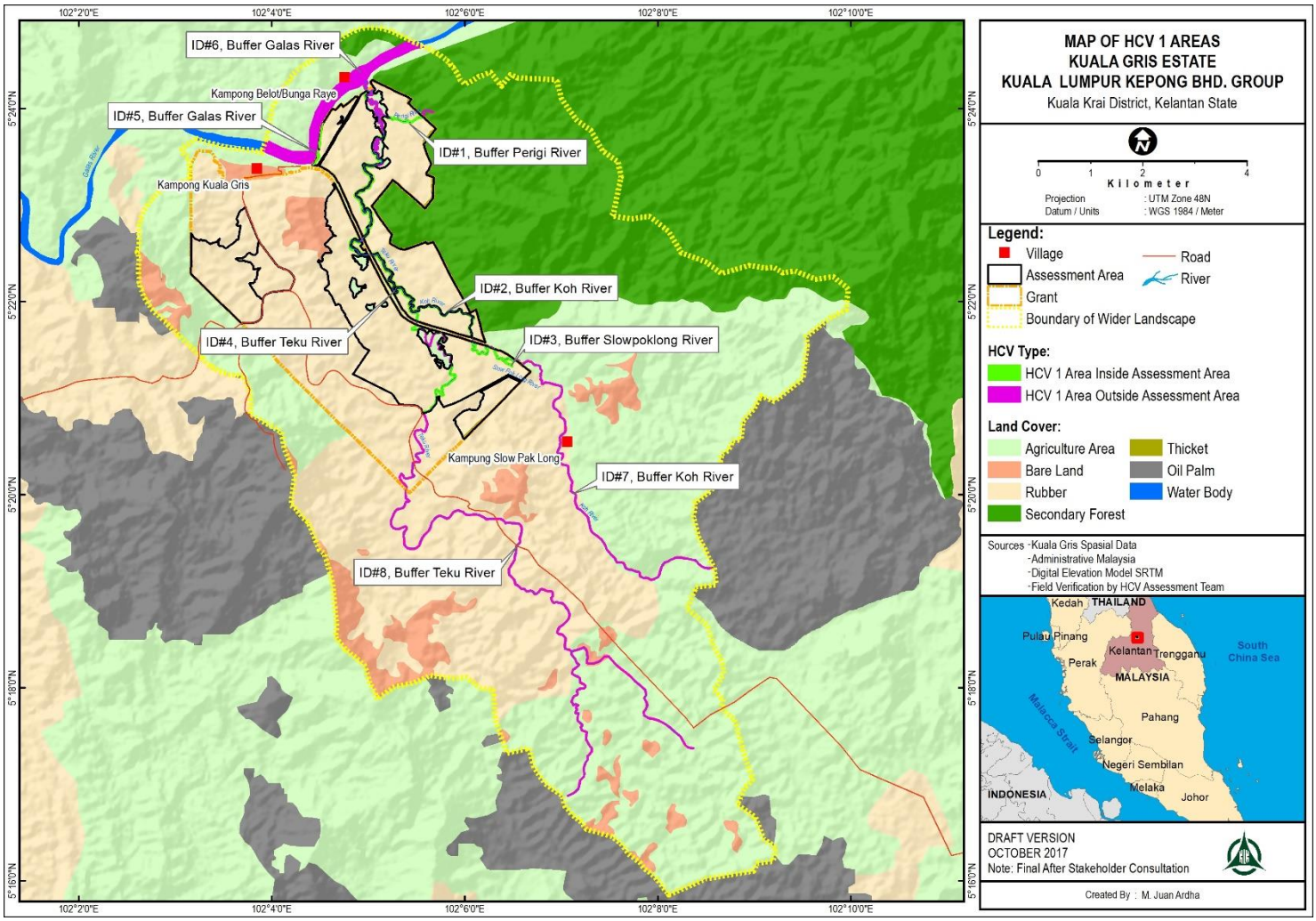


Figure 5.1. Map of HCV 1 areas in Kuala Gris Estate

HCV 2: Landscape, Ecosystem Mosaics and Intact Forest Landscapes

The presence of HCV 2 is characterised with large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance (Brown, *et al.*, 2013). Conditions as presented in **Table 5.5** can be used to detect the presence of HCV 2 (Brown *et al*., 2013).

This assessment concludes that the requirements for an area to be considered as HCV 2 are not met within the assessment area, except in Kuala Gris estate where an HCV 2 potential is found. The location of the HCV 2 area at Kuala Gris estate is outside the assessment area of Kuala Gris, but inside the boundary of the wider landscape. Several parts inside the concession area of Kuala Gris estate overlap with the Tiger Conservation Landscape (TCL) and the Central Forest Spine (CFS). These areas are recommended as High Conservation Value Management Areas (**HCVMAs**). These areas do not consist of natural ecosystem because the entire plantation was developed *ca*. 90 years ago. The areas can be converted from rubber plantation into oil palm plantation, with precaution as recommended in this report (***see chapter HCV Management and Monitoring***).

Table 5.5. Summary of conditions that may indicate the presence of HCV 2 in the assessment area

Indicators that qualify as HCV 2	Assessment area	
	Kuala Gris Estate	Kemasul Estate
Large areas (>50.000 ha) that area relatively far from human settlements, roads or other access.	-	-
Smaller areas that provide key landscape function such as connectivity and buffering	*	-
Large area that are more natural and intact than most other such areas	-	-

Note: ✓ = present; - = absent, *= potential

Justification of HCV 2 potential:

- The assessment area is situated in an environment that has already been developed for rubber plantations *ca*. 90 years ago. Its location is near local community settlements with already open road access.
- The local environment in the assessment area consists only of oil palm and rubber plantations, making it no longer part of a vast natural landscape.
- The assessment area was once a lowland forest ecosystem, but it has undergone severe degradation as a result of timber extraction, land clearing for farmlands, and of fires. The remaining ecosystem is now covered with bushes and shrubs.
- The assessment results indicate that the assessment area has no ecosystem whatsoever, and therefore no ecosystem connectivity to other ecosystems, both in or around the area.
- The assessment area is located far from any Intact Forest Landscape (**Figure 5.2**). The nearest Intact Forest Landscape area is located at 24 km west from Kuala Gris Estate.
- The boundary of Kuala Gris Estate is partly overlapping with the Tiger Conservation Landscape map, but it is not part of the actual Tiger Conservation Landscape (TCL) as originally intended (*see* **Figure 5.3)**. The concept of the TCL was initiated in 2008 when the National Tiger Action Plan for Malaysia was enacted, *ca*. 75 years after Kuala Gris was developed into a plantation area. According to the Malaysian Conservation Alliance for Tigers (MYCAT), three types of tiger habitat in Peninsular Malaysia are identifi ed based

on tiger data collected by the Department of Wildlife and National Parks Peninsular Malaysia, namely: 1) Confirmed tiger habitats that include Totally Protected Areas and Permanent Reserved Forests with records of tigers; 2) Expected tiger habitats that include forest blocks physically connected to the confi rmed tiger habitats but yet surveyed; and 3) Possible tiger habitats that include blocks of forest (and shrubs) isolated from the confirmed tiger habitats in all states with tigers[5]. In Kuala Gris, none of these three tiger habitat types is found since the late 1930s. However, as the boundaries of Kuala Gris Estate are partly overlapping with the TCL and the Central Forest Spine (CFS), these ovelapping areas are therefore identified as HCV Management Area (**"HCVMA"**) to prevent conflicts between wildlife and humans, specifically plantation workers. These areas are defined as areas that can be developed for oil palm plantations ("go areas") by taking into account the management recommendations in this report.

- The Central Forest Spine (CFP)[6] of Peninsular Malaysia is protected because of its population of the Malayan Tiger (**Figure 5.4**), for having rich biodiversity, and for the provision of ecosystem services such as the water supply for most of the human population on the Malay Peninsula[7]. The CFS is part of the TCL under "tiger habitat type number 1" (*see* above paragraph).
- The actual HCV 2 area is only located outside of concession area, but within the wider landscape boundary (*see* **Figure 5.5**). There is still forest in the surrounding area, but there is no connecting forest area inside the assessment area (the assessment area has already been completely developed for plantations *ca*. 90 years ago).

[5] https://www.researchgate.net/publication/267429577
[6] http://www.townplan.gov.my/content.php?ID=118
[7] UNDP/GEF-GOM Project : Improving Connectivity In The Central Forest Spine Landscape – (IC-CFS)

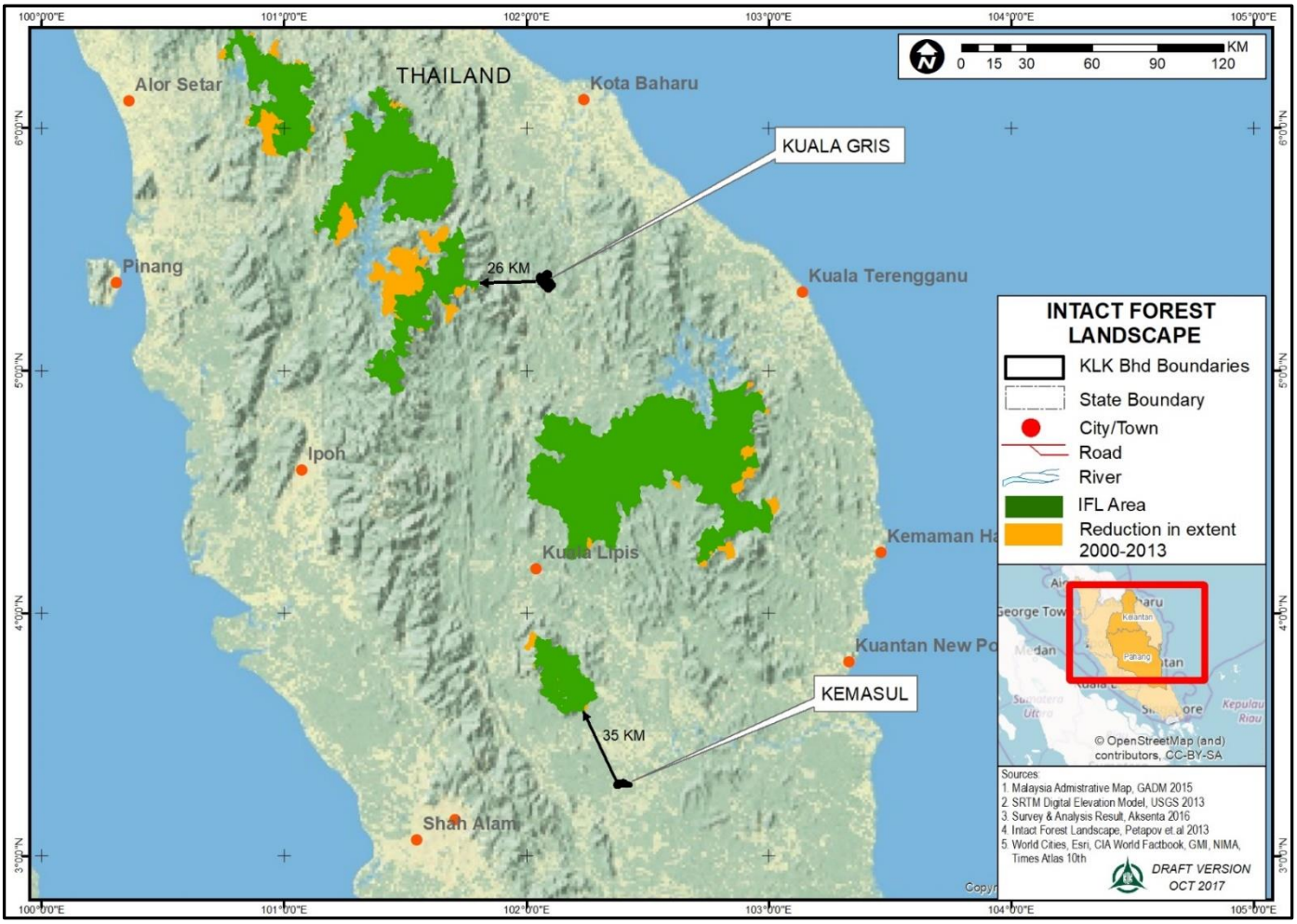


Figure 5.2. Map of the assessment area projected on the Intact Forest Lanscape map

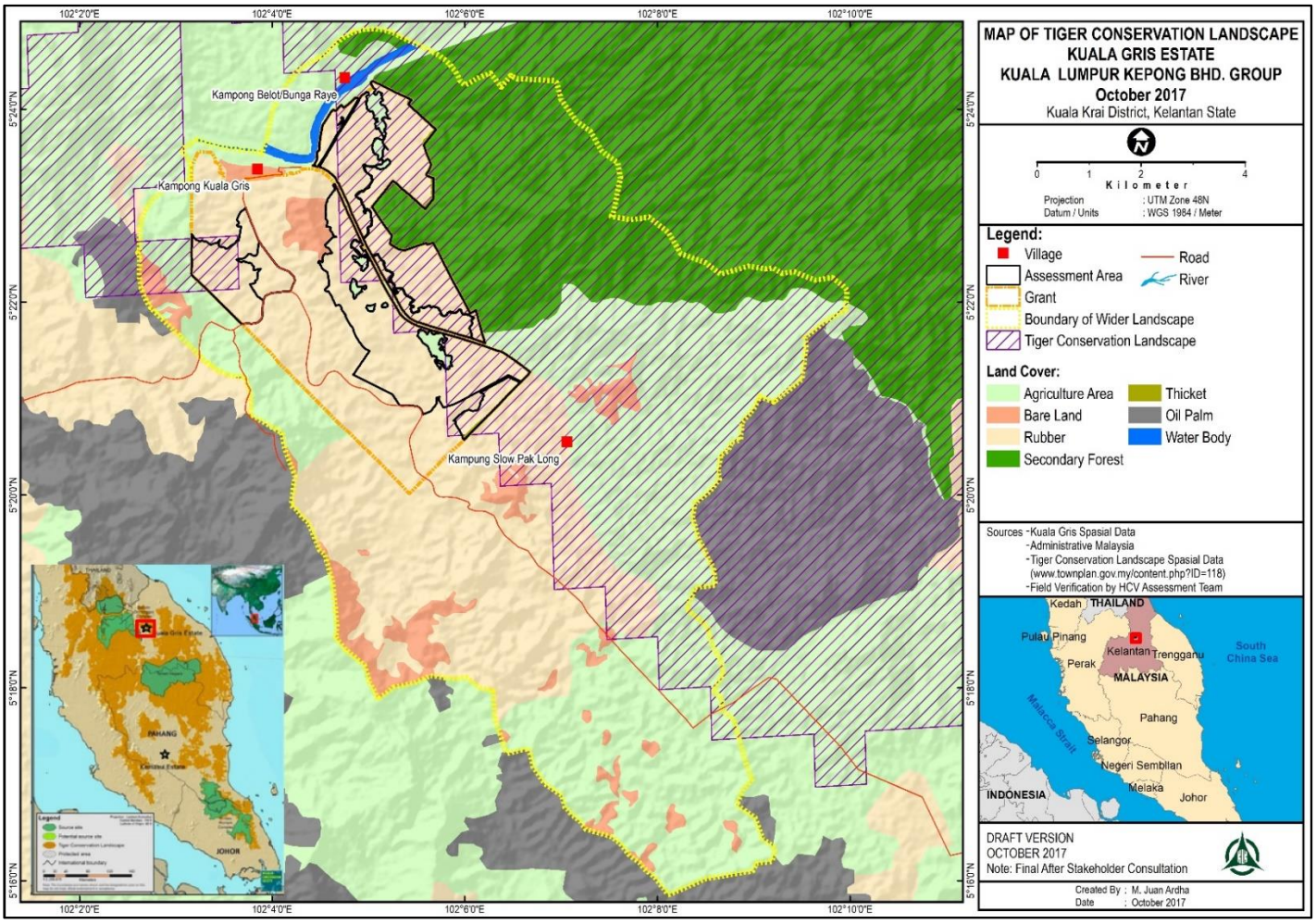


Figure 5.3. Map of the assessment area projected on the Tiger Conservation Lanscape map

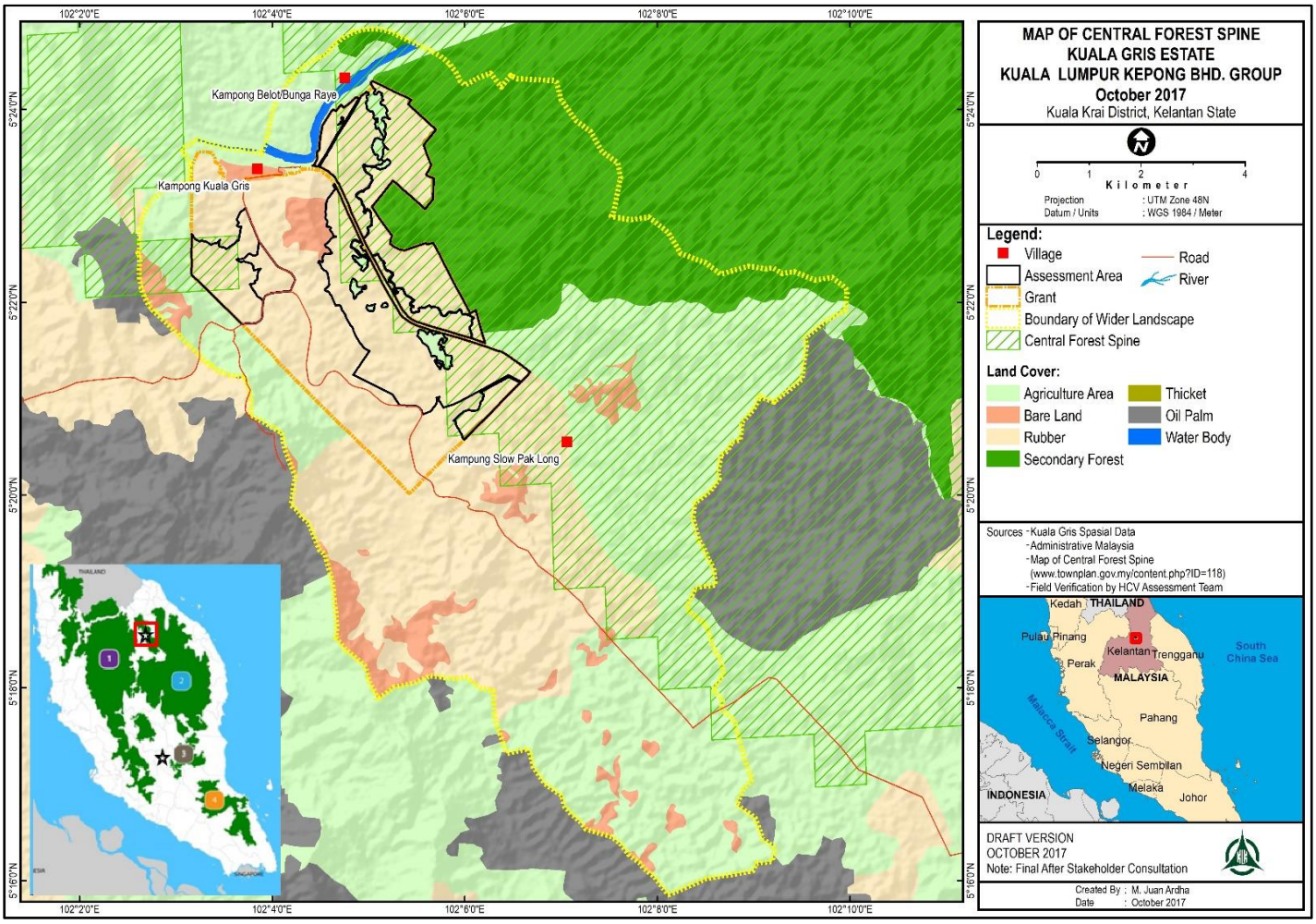


Figure 5.4. Map of the assessment area projected on the Central Forest Spine map

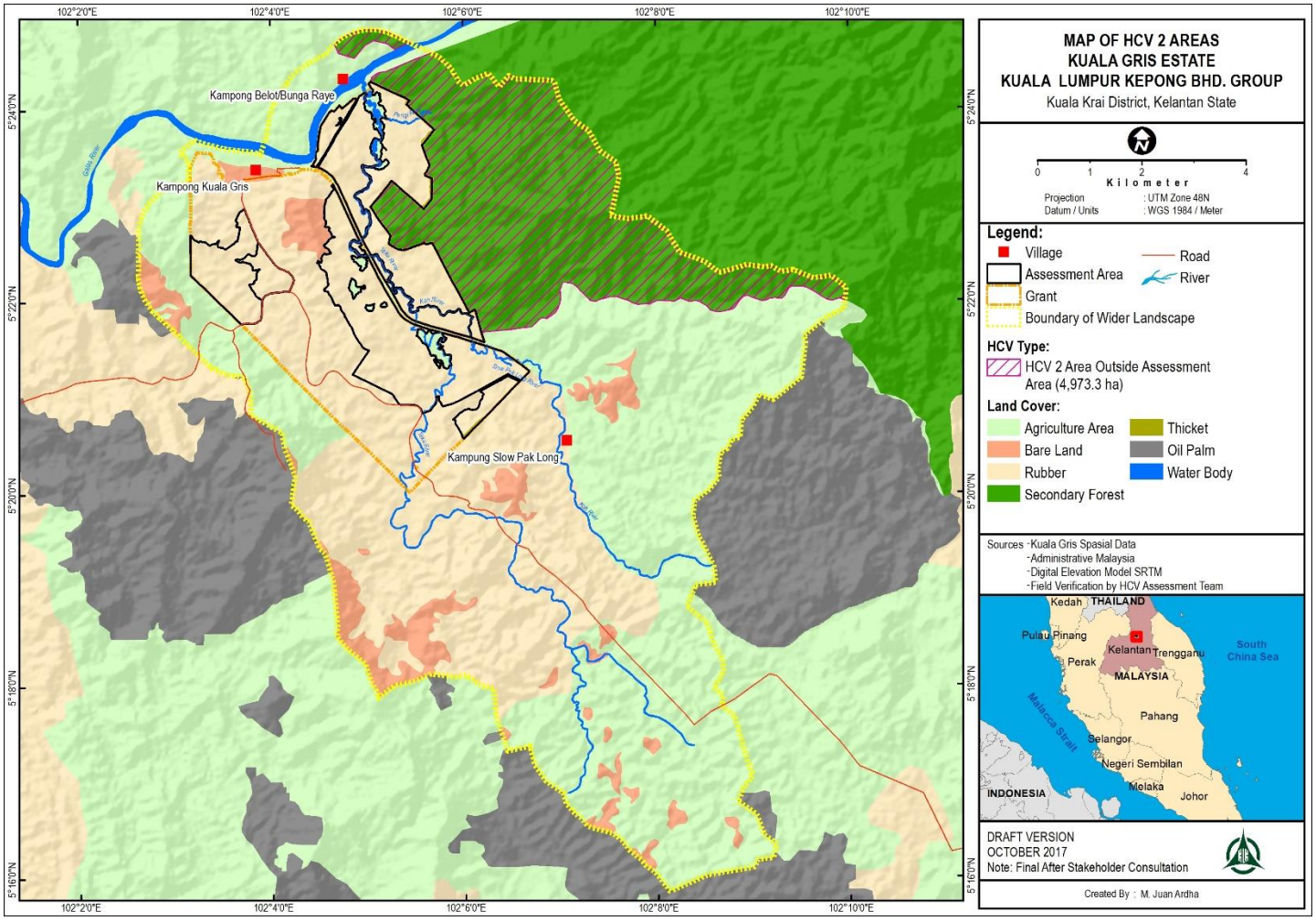


Figure 5.5. Map of potential HCV 2 areas around Kuala Gris Estate

HCV 3: Ecosystems and Habitats

The presence of HCV 3 is characterised by rare, threatened or endangered ecosystems, habitats or refugia. HCVA 3 identification in the field aims to ensure the presence of undisturbed natural ecosystem in the assessment area. If a natural ecosystem is found, it will be identified whether it is considered a (nationally or internationally) rare or threatened ecosystem. While the presence of HCVA 3 in the field may take various forms, almost all of these areas should be still in natural condition.

There are 4 criteria of ecosystem that are considered to meet the requirements of HCV 3 presence. They are: naturally rare; anthropogenically rare, threatened or endangered, and classified as threatened under national or international systems (Brown *et al*., 2013). **Table 5.6** presents situations for detecting the presence of HCVA 3 (Brown *et al*., 2013). According to this assessment output, areas are not found meeting HCV 3 criteria in the assessment area.

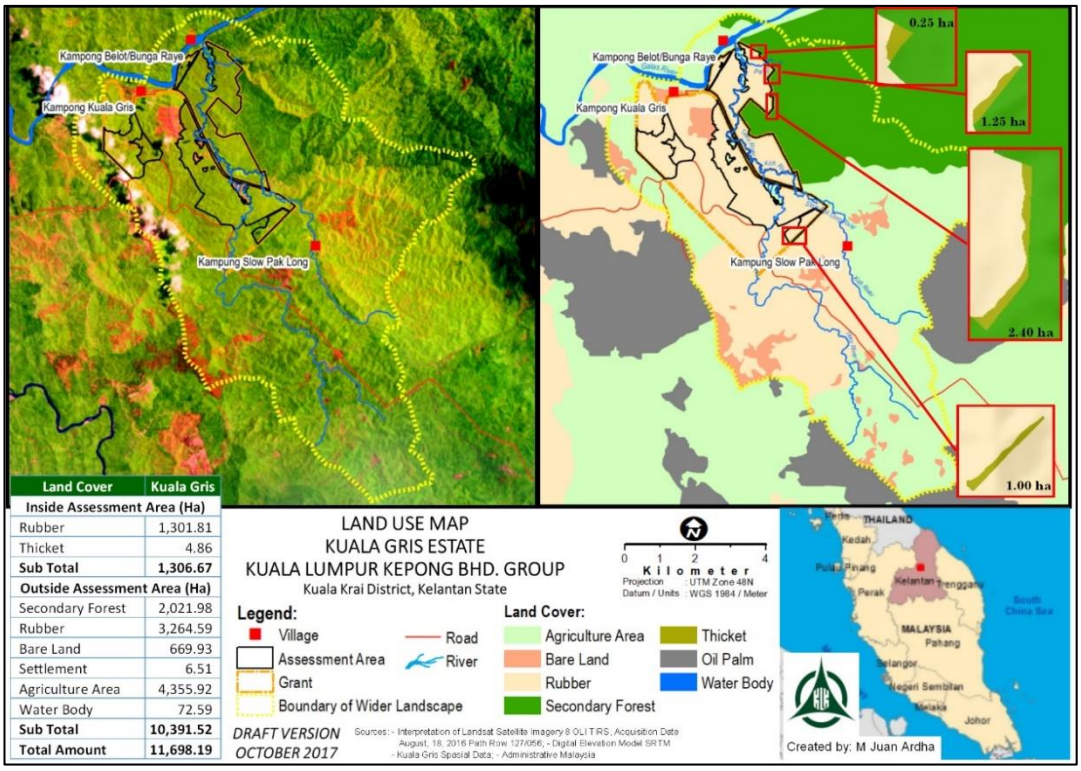
Table 5.6. Summary of conditions that may indicate the presence of HCV 3 in the assessment area

Indicators that qualify as HCV 3	Assessment area	
	Kuala Gris Estate	Kemasul Estate
Naturally rare because they depend on highly localized soil, locations, hydrology or other climatic or physical features	-	-
Anthropogenically rare compared to their historic extent	-	-
Threatened or endangered due to current or proposed operation	-	-
Classified as threatened in national or international system	-	-

Note: ✓ = present; - = absent, *= potential

Within the boundaries of the assessment area of Kuala Gris Estate, such as bushes and shrubs along the rivers remain as natural vegetation. This vegetation includes mainly pioneer species. In addition, several very small pockets of natural thickets remain, varying from 0.25 to 2.40 hectares, and totaling 4.86 ha. These thickets are located along the border with a state production forest area in the eastern and southern part of the Grant Area of Kuala Gris (**Figure 5.6**). Based on the information obtained from the company, these thickets have been cleared for rubber cultivation in 1995 but were later left to re-grow naturally as the company was not sure of the exact position of its legal boundary (Grant Area). Several public consultation participants provided the same information on shrub vegetation for the nearby production forest area.

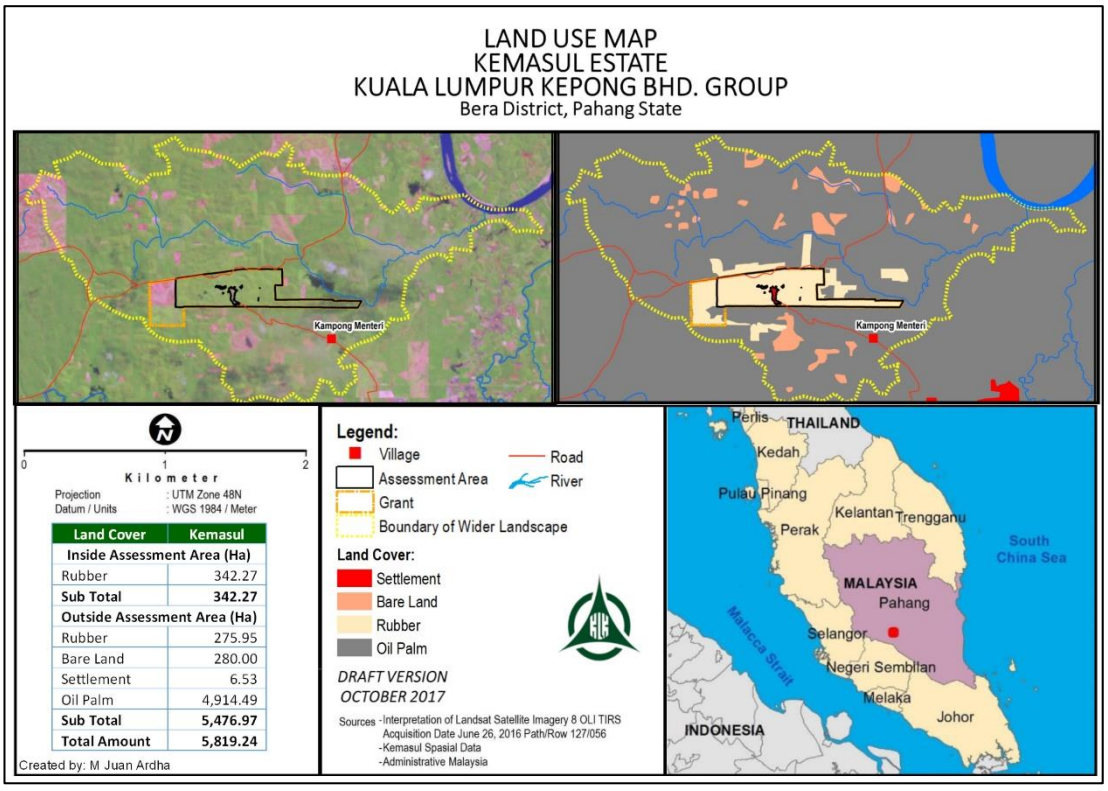
In the assessment area of Kemasul Estate has already been an intensive rubber plantation for a long time (> 30 years) and consists 100% of intensive rubber plantations (**Figure 5.7**), and therefore no unique and rare ecosystems area found. The land cover in the surrounding areas consists of oil palm and shrubs.



Land Cover	Kuala Gris
Inside Assessment Area (Ha)	
Rubber	1,301.81
Thicket	4.86
Sub Total	**1,306.67**
Outside Assessment Area (Ha)	
Secondary Forest	2,021.98
Rubber	3,264.59
Bare Land	669.93
Settlement	6.51
Agriculture Area	4,355.92
Water Body	72.59
Sub Total	**10,391.52**
Total Amount	**11,698.19**

Source: Aksenta, 2016b.

Figure 5.6. Map of land cover within the assessment area of Kuala Gris Estate, showing thickets on the eastern and southern borders of the Grant Area of Kuala Gris Estate



Land Cover	Kemasul
Inside Assessment Area (Ha)	
Rubber	342.27
Sub Total	**342.27**
Outside Assessment Area (Ha)	
Rubber	275.95
Bare Land	280.00
Settlement	6.53
Oil Palm	4,914.49
Sub Total	**5,476.97**
Total Amount	**5,819.24**

Source: Aksenta, 2016b.

Figure 5.7. Map of land cover within the assessment area of Kemasul Estate, showing that the area is completely covered with intensive Rubber plantation

HCV 4: Ecosystem Services

HCV 4 area constitutes areas of important values as basic ecosystem service in critical situations, including water catchment protection and erosion control in vulnerable lands and slopes. This critical situation is defined as condition when such disturbance towards ecosystem service leads to severe, catastrophic threats or otherwise has cumulatively negative impacts on local communities' prosperity, health or survivability, and functions of vital infrastructures or other HCVs (Brown *et al*., 2013). For this reason, HCV 4 presence is detected based on the conditions where ecosystem services play an important role in critical conditions (**Table 5.7**).

Table 5.7. Summary of conditions that may indicate the presence of HCV 4 in the assessment area

Indicators that qualify as HCV 4	Assessment area	
	Kuala Gris Estate	Kemasul Estate
Managing extreme flow events, including vegetated riparian buffer zones or intact floodplains	✓	-
Maintaining downstream flow regimes	✓	-
Maintaining water quality characteristics	✓	-
Fire prevention and protection	-	-
Protection of vulnerable soils, aquifers and fisheries	-	-
Provision of clean water	-	-
Natural ecosystems play an important role in stabilising steep slopes	-	-
Protection against winds, and the regulation of humidity, rainfall and other climatic elements	-	-
Pollination services, for example exclusive pollination of subsistence crops	-	-

Note: ✓ = present; - = absent, *= potential

HCV 4 is only identified in the assessment area of Kuala Gris Estate in the form of rivers and their riparian buffer areas; functions of ecosystem services in the area relating to flow regimes (flood control; **Table 5.8**).

In the assessment area of Kemasul Estate, no areas are found which indicate the presence of HCV 4, because of the following:

- The entire concession of Kemasul Estate in situated in a slightly undulating lowland area with an elevation of 0-200 m a.s.l. Areas with steep slopes (>25^0) are not found in Kemasul Estate; areas with slopes of 15^0-25^0 can be found in the western part of Kemasul Estate, but they are no longer covered with natural vegetation. The hilly areas have been fully terraced and well managed to decrease erosion and surface run-off since the 1940's. Therefore, important values regarding to natural erosion prevention are not present.
- No rivers flow through or adjacent to the assessment area of Kemasul Estate

In Kuala Gris Estate, areas with a total size of only 7.00 ha have steep slopes (>25^0), which is equivalent to 0.52% of the total study area of 1,357 ha. In addition, the hills with an elevation of 100-200 m a.s.l. only total 26.65 ha, and with an average elevation of the concession area of 50 – 100 m, these hilly areas only rise up to maximum 150 m (range = 0-150 m difference in elevation) from the surrounding land surface.

The Teku River is the main river in Kuala Gris Estate. It flows from the south and empties into the Galas River situated to the north, outside the estate. Along this river, there are tributaries such as the Koh River (including Slowpoklong River) and the Perigi River (**Figure 5.8**).

Therefore, protection of important functions of the rivers in Kuala Gris Estate includes their conservation and management.

The three rivers have important values and contribute to the regime or water discharge control (**managing extreme flow events**) of the Teku River, and thus **maintaining downstream flow regimes**. This relates to the river's natural drainage mechanism or capacity to accommodate surface run-off. The natural mechanism that takes place in the river network prevents simultaneous discharge accumulation in the main river. In this way, maximum-minimum discharge fluctuation and risk of flooding in the Teku River can be kept at a minimum level.[8] Therefore, the river's natural form, along with its flow accommodation capacity, needs to be maintained to guarantee its functions as flood control area.

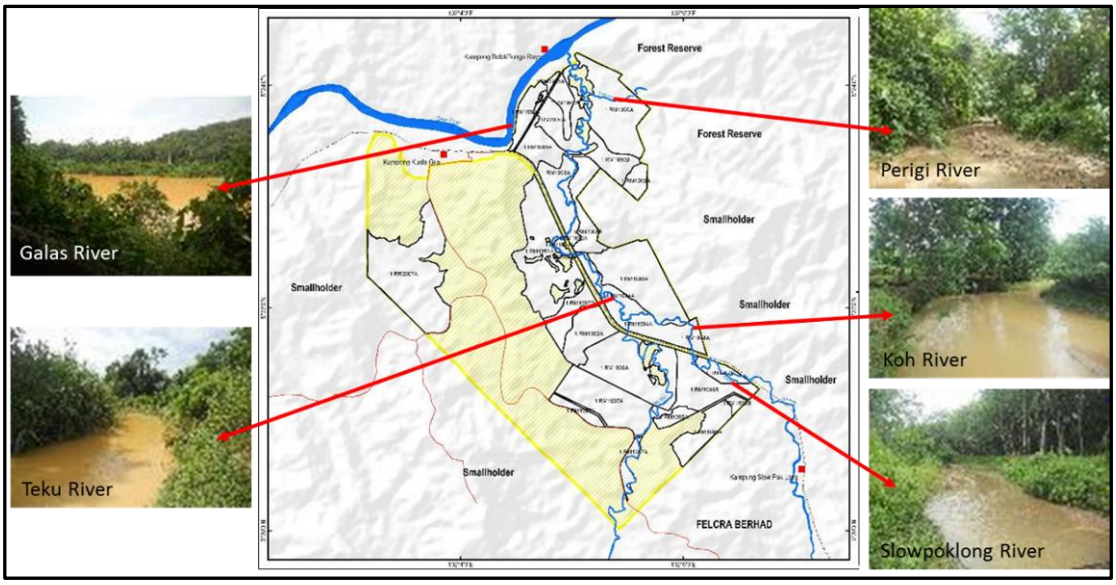


Figure 5.8. Rivers in Kuala Gris Estate and its surroundings

In the southern part of Kuala Gris Estate, the characteristics of the Teku River resemble those of an upstream river. It is relatively narrow (3-5 m) and the cross-section has cliffs of 1-3 m height. In the northern part, Teku River shares the same characteristics with downstream rivers where the cross-section has no cliffs, of 10-15 m width, and has a floodplain of 10-30 m width from the stream bank. In comparison, widths of other rivers vary 'only' 5-10 m and share the same characteristics with the upstream-middle Teku River. Given such profile, the rivers in the assessment area are considered insignificant to function as natural firebreaks (**fire prevention and protection**),[9] although their water discharge fills year-round.

[8] This particularly concerns local-scale flooding or inundation. Referring to the watershed boundaries, Kuala Gris Estate is located in the downstream Galas watershed, so that potential of large scale flooding in this area is more affected by the condition of the discharge of the Galas River's. Such potential will grow when very high rainfall takes place such in December 2014. The 2014 flood was recorded as the worst flood in the past decade (Akasah and Dorasaimy, 2015), and even one of the worst since the 1927 and 1967 big floods (Fathiyah, 2016).

[9] Site that may function as natural fire break (**fire prevention and protection**) in this area is the Galas River, but it flows outside the Kuala Gris Estate.

Table 5.8. Profile of the rivers in Kuala Gris

No	River	Width (m)*	Water physical quality*	Flow continuity	Riparian area**)	Sub-watershed
1	Teku	Upst.: 3-5 Downst.: 10-15	Turbid	Year-round	Rubber, shrubs (downstream)	Galas
2	Koh	5-7	Slightly turbid	Year-round	Rubber	Galas
3	Slowpoklong	6-8	Slightly clear	Year-round	Rubber	Galas
4	Perigi	8-10	Clear	Year-round	Rubber and shrubs	Galas

Note: *) Field observation output; **) Dominant type of land cover

Different river cross-section profiles and segment characteristics imply difference in riparian area width and conservation purpose. As for the upstream river segment, river conservation concerns with reinforcement of riverbank to prevent against morphoerosion or riverbank landslides, as well as water quality control (**maintaining water quality characteristics**) including control of erosion and pollutants. Upstream river's riparian areas are normally smaller than those of the downstream ones. This is because conservation of downstream rivers and riparian areas relates to flood control, thus a relatively larger size will be necessary for the retarding area. For this reason, downstream Teku (and Galas) rivers require a riparian buffer wider than segments of other rivers.

The **provision of clean water, for example where local communities depend on natural rivers and springs for drinking water** is present in the community from Belut Village near Kuala Gris Estate, which uses water from a spring as a source of clean water for drinking and sanitation. However, this spring is located outside of the assessment area.

Areas important for **protection against winds, and the regulation of humidity, rainfall and other climatic elements** are only present in areas with a high variety in contour, i.e. high hills, cliffs and mountains, whereas Kuala Gris and Kemasul Estates are located in slightly undulating lowland areas, dominated with slope classes of less than 25^{o} (99.48% at Kuala Gris Estate and at 100% at Kemasul Estate). However, in Kuala Gris Estate 7.0 hectares of areas with steep slopes of more than 25^{o} occur, which is equivalent to 0.52% of the total study area of 1,357 ha. In addition, the hills with an elevation of 100-200 m a.s.l. only total up to 26.65 ha, and with an average elevation of the concession area of 50 – 100 m, these hilly areas only rise up to maximum 150 m (range = 0-150 m difference in elevation) from the surrounding land surface. Therefore it can be safely concluded that Kuala Gris and Kemasul Estates do not have any important areas for protection against winds, regulation of humidity, rainfall, and other climatic elements.

Pollination services are not present in the assessment areas, as the pollinators are dependent on the presence of suitable forest habitat and do not survive in purely agricultural landscapes. As explained earlier (*see* section HCV 3), both Kuala Gris and Kemasul Estates consist entirely of monocultural intensive Rubber plantations.

In Peninsular Malaysia and Sabah, a momphid moth *Pyroderces sp*., may contribute to oil palm pollination (Syed, 2009)[10]. Based on information from local communities, habitat of pollination agents such as bats and insects are not found in the assessment area.

[10] Syed, 2009. Studues on oil palm pollination by insects. Cambridge Universty Press

Forests, wetlands and other ecosystems which provide a protective barrier against destructive fires that could threaten communities, infrastructure or other HCVs, are not present in the assessment areas, as described earlier (*see* section on **HCV 3**).

Grasslands providing buffering against flooding or desertification are not present in the assessment areas, as the areas consist entirely of dry land Rubber plantations.

Currently naturally vegetated riparian areas remain only in downstream Teku River and Perigi River. Their condition is already degraded and they are only covered with bushes and shrubs. Nevertheless, these areas, including other riparian areas, need to be conserved and managed to support important river functions. Such management includes: avoidance of replanting to allow natural succession to take place, vegetation enrichment (when necessary), and restriction of fertiliser and agrochemical application. These management activities need to be integrated into HCV management, so that these riparian areas should be categorised HCV Management Area (**"HCVMA"**).

Total size of HCV 4 area (including the HCVMA) in Kuala Gris Estate is 67.4 ha (5 % of the estate Grant area). The table below presents the distribution of HCV 4 areas in Kuala Gris Estate, which entirely overlap with HCV 1 area. Considering important functions of riparian areas and based on HCV Toolkit for Malaysia (WWF-Malaysia, 2009), the width of the riparian buffers in the assessment area of Kuala Gris Estate varies from 10 m to 50 m (**Table 5.9**, **Figure 5.9**).

Table 5.9 Locations HCV 4 areas in Kuala Gris Estate

ID	Location	HCV Element	Indicative Boundary	Area (ha)*
HCV Inside of Assessment Area (Grand of Kuala Gris Estate)				
01	Perigi River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	2.3
02	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	7.5
03	Slow Pok Long River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	0.6
04	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m (upstream) and 20 m (downstream) buffer along both sides of the river	55.2
05	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	1.8
Total Area of HCV (ha) inside of assessment area				**67.4**
Area of Kuala Gris Estate (ha)				**1,357,1**
Percentage of HCV Area (%)				**4.96**

ID	Location	HCV Element	Indicative Boundary	Area (ha)*
HCV Outside Assessment Area (Grand of Kuala Gris Estate)				
06	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	94.9
07	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	80.4
08	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m (upstream) and 20 m (downstream) buffer along both sides of the river	11.4
Total Area of HCV (ha) outside of assessment area				**186.7**

Note: *) Estimate of area based on GIS calculation

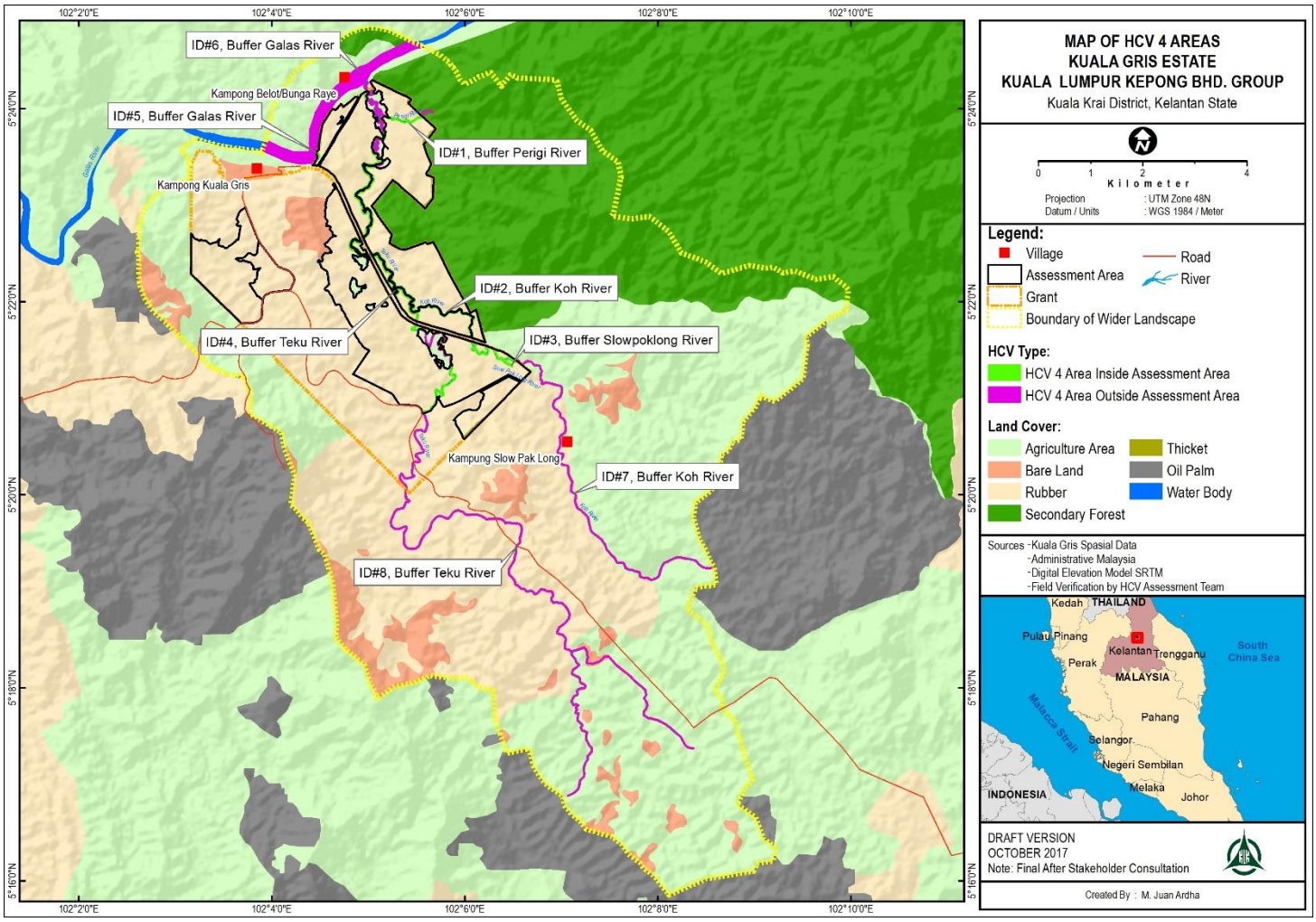


Figure 5.9. Map of HCV 4 area in Kuala Gris Estate

HCV 5: Community Needs

The presence of HCV 5 is identified through engagement with local communities or indigenous peoples (Brown *et al*., 2013). Based on stakeholder consultations with local communities around the assessment area, it is concluded that they are not depended on forest areas for livelihood, health, nutrition and water (**Table 5.10**).

In Kuala Gris Estate three villages are found, namely; Belut, Kuala Gris and Slow Pak Long. The villages around Kuala Gris Estate consist of a total of 401 houses and 1,749 people. In Kemasul Estate only one village is found namely Menteri, the total population in Menteri Village is 200 people and 66 houses.

The livelihood of local communities around Kuala Gris Estate is smallholder rubber plantation. This is different from the local community around Kemasul Estate, who mainly have smallholder oil palm plantations or are working in the industry sector.

The majority of local communities meet their basic needs by buying from small shops in their villages, as well as in the town market, and the availability of facilities and infrastructures that the Government built in the 1970s, allows them to no longer depend on the natural resources for their livelihoods. However, especially for Belut Village in Kuala Gris Estate, the local people are using water from a spring as a source of clean water for drinking and sanitation. The location of the water spring is in Belut Village (outside the assessment area) and therefore not mapped in this assessment.

The source of basic needs fulfilled through purchasing is available the whole year in small shops their villages. The villages around Kuala Gris and Kemasul Estates already has public infrastructure such as road, the logistics as a basic need of local communities could distributed.

Table 5.10. Summary of conditions that may indicate the presence of HCV 5 in the assessment area

Indicators that qualify as HCV 5	Assessment Areas	
	Kuala Gris Estate	Kemasul Estate
Hunting and trapping grounds (for game, skin and furs)	-	-
NTFPs such as nuts, berries, mushrooms medicinal plants, rattan	-	-
Fuel for household cooking, lighting and heating	-	-
Fish (as essential sources 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 buy essentials including medicine or clothes, or to pay for school fees	-	-

Source: Consultation with local communities, 2016

Note: ✓ = present; - = absent, *= potential

Hunting and Trapping Grounds

The local communities around the assessment areas do no longer practice hunting and trapping because they are modern Malay communities. The demand for meat from the communities around the assessment areas are supplied by shops, markets and farms. The price for chicken meat is RM 9-11/kg, and for beef RM 18-22/kg. All the prices of the basic needs are regulated by the government in Malaysia.

Non-Timber Forest Products (NTFP)

The local communities around the assessment areas do not utilize NTFP, and are therefore not dependent on forest products, because they consist of farmers (agricultural communities). The agricultural activities of the local communities are supported by the government. Several organizations which support community agriculture which were created by the government, are: Rubber Industry Smallholders Development Authority (RISDA), the Federal Land Development Authority (FELDA), and the Federal Land Consolidation and Rehabilitation Authority (FELCRA). The objectives all these organizations is to support community agriculture by providing cultivation techniques, seeds and seedlings, tools, markets and standards of commodity pricing.

Some communities around the assessment areas, such as the community from Belut Village, produce honey. This product originates from cultivation areas, and not from forest. The honey products must have a license from the government to guarantee the standard.

Fuel for household cooking, lighting and heating

None of the communities around the assessment area use firewood originating from the forest as fuel for cooking. The source of fuel for household cooking is obtained from LPG (Liquefied Petroleum Gas). The price of LPG in villages in around assessment areas is ± RM 35.00 /12kg. All the villages around the assessment area have infrastructure for lighting from the state electricity company Tenaga Nasional Bhd (TNB), since the 1970s. This is one of the reasons that local communities do no longer depend on forests.

Fish and Other Freshwater Species Relied on by Local Communities

As described in sub chapters hunting and trapping, the local communities are modern Malay communities. All demand for meat and fish is provided by shops and markets, originating from fish ponds, and during our surveys, we did not find any local people who were fishing.

Building Materials

The local communities obtain building materials through buying. All of building materials are industrial products. Based on the results of consultations with local communities, there are no more forest areas which provide materials for the local communities. The local community states that the use of forest is regulated by the government, and that it is not allowed to use forests without a license.

Fodder for Livestock and Seasonal Grazing

The local community does not practice seasonal grazing, as they only practice small-scale farming. Generally, the livestock most commonly found are cows (cattle) and chickens. All cattle are kept within the village area. Generally, the fodder consists of grass in the rubber and oil palm plantations, while chickens fodder is leftover food from the village households.

Water Sources

The local communities in Kuala Gris and Slow Pok Long Villages (Kuala Gris Estate) obtain their water from the government owned Air Kelantan Sdn Bhd water company, and the local community in Menteri Village (Kemasul Estate) from Pegurusan Air Pahang Bhd. water company. The exception is the community from Belut Village near Kuala Gris Estate, which uses water from a spring as a source of clean water for drinking and sanitation. This spring is located outside of the assessment area.

Livelihood

The fundamental livelihoods for local communities around the assessment area are agricultural products such as rubber and oil palm fruits. The communities around the assessment in Kuala Gris Estate depend on rubber and mainly work in rubber plantation, while communities around the assessment areas in Kemasul Estate depend on oil palm plantations. These agricultural activities represent their fundamental livelihood since a long time (>30 years).

HCV 6: Cultural Values

HCVA 6 presence is characterized with 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.

Results of stakeholder consultations with the local communities indicate that sites or areas with cultural value are not found in the villages around the assessment areas. The majority of the local communities around Kuala Gris Estate are of Malays ethnicity, and around Kemasul Estate of Chinese ethnicity. They do not have any interaction with the forest or with nature for religious or cultural activities (**Table 5.11**).

Table 5.11. Summary of conditions that may indicate the presence of HCV 6 in the assessment area

Indicators that qualify as HCV 5	Assessment Areas	
	Kuala Gris Estate	Kemasul Estate
Sites recognised as having high cultural value within national policy and legislation	-	-
Sites with official designation by national government and/or an international agency like UNESCO	-	-
Sites with recognised and important historical or cultural values, even if they remain unprotected by legislation	-	-
Religious or sacred sites, burial grounds or sites at which traditional ceremonies take place that have importance to local or indigenous people	-	-
Plant or animal resources with totemic values or used in traditional ceremonies	-	-

Source: Consultation with local communities, 2016
Note: ✓ = present; - = absent, *= potential

Sites recognised as having high cultural value within national policy and legislation
In this area there are no sites acknowledged of high cultural values by national policies and legislation. Malaysian policies and legislation[11] only assigned 50 cultural heritage sites in Malaysia, and none is located within the assessment areas. A complete list of the 50 cultural heritages is publicly available[12].

Sites with official designation by national government and/or an international agency like UNESCO
Malaysia has four UNESCO-registered sites which are gazetted, and one tentative site, namely[13]: (1) the Archaeological Heritage of the Lenggong Valley in Perak, (2) Gunung Mulu National Park in Sarawak, (3) Kinabalu Park in Sabah, (4) Melaka and George Town, Historic Cities of the Straits of Malacca, and the Taman Negara National Park of Peninsular Malaysia (tentative list). All sites are situated far away from the assessment area (**Figure 5.10)**.

[11] Based on National Heritage Act 2005 (Act 645) on http://www.malaysiavacationguide.com/nationalheritage.html
[12] http://www.malaysiavacationguide.com/nationalheritage.html
[13] http://whc.unesco.org/en/statesparties/?searchStates=Malaysia&id=my&region=2&submit=Search

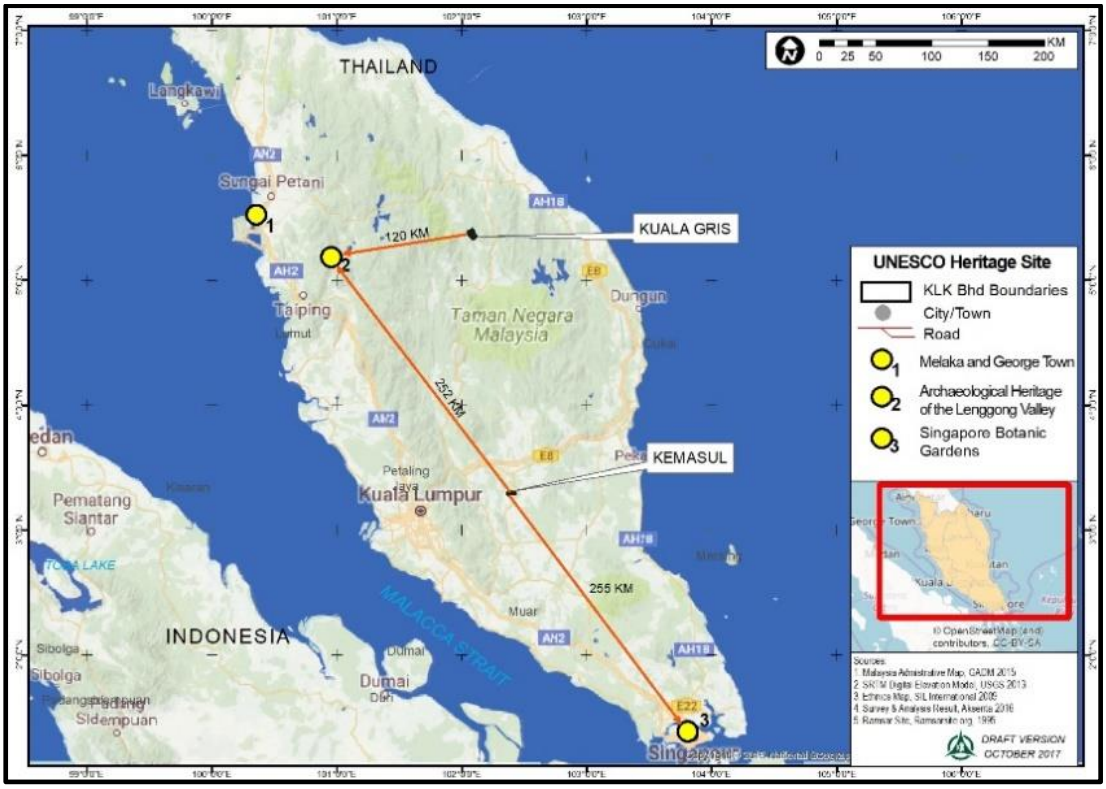


Figure 5.10. Location map of World Heritage Sites in Malaysia (UNESCO, 2017)

Sites with recognised and important historical or cultural values

According to the result of stakeholder consultations, the local communities around the assessment areas do not interact with sites or areas for historical and cultural reasons. However, we found interaction between workers from India with Kuala Gris Estate. There is a Hindu temple within the Grant Area of Kuala Gris, but outside of the assessment area, because of the large population of Indian ethnics who have worked in Kuala Gris Estate since the 1920s under the Duff Development's management. This temple is still maintained to date. The temple does not include HCV 6 criteria because the temple is similar to any other modern house of worship.

Religious or sacred sites and Totems

There are two types of communities in the assessment area, i.e. the communities who originally inhabit the area, and the other whose presence is due to the estate's operational activities. Native communities only inhabit Kuala Gris Village, but the village completely depends on plantation company activities (Kuala Gris Estate). As for the other villages around the assessment area, the presence of the migrant communities is due to the presence of the company. These people initially migrated to the area surrounding the assessment area because of employment.

Ethnics who inhabit Kuala Gris Estate area are dominated by Malayan ethnics who are Muslims, while those who inhabit Kemasul Estate are dominated by Buddhist Chinese ethnic. The local communities around the assessment areas are not familiar with sacred sites or traditional ceremonial places and totems.

Totem is a ritual bond of groups, kinship that use animals, plants or natural objects that serve as clans or family symbols among traditional tribes. Based on interview with local communities, Melayu ethnics not use plant and animal resources to totem and traditional ceremonies, because they are Muslim. The religion of Islam does not allow to worship objects such as animals and plants.

4.1.1. Summary of findings

Findings and Result
National and Regional Context

The assessed area is located on the eastern side of the Malay Peninsula, where 5 terrestrial WWF Ecoregions of global importance are found, namely the Greater Sunda Mangroves, the Kayah-Karen/ Tenasserim Moist Forests, the Sundaland Rivers and Swamps, the Peninsular Malaysian Montane Rain Forests, and the Peninsular Malaysian Rain Forests. The latter two ecoregions, namely the montane and lowland Rain Forests, are present around the study site. The total area consists of 142,500 km^2, with Tropical and Subtropical Moist Broadleaf Forests as the main habitat type[14]. Globally acknowledged Key Biodiversity areas[15] near the assessment areas include Belum-Temenggor and the Krau Wildlife Reserve.

Malaysia has only 0.2% of the world's land mass, but its diversity of flora and fauna species makes it one of the richest countries in the world in terms of biodiversity per unit area, second only to Indonesia in South East Asia. The 2001 Global Diversity Outlook recognised Malaysia as one of the 12 mega-diversity countries in the world (CEMD, 2006).

According to WWF Global[16], Peninsular Malaysia has a very rich flora and fauna, with *ca*. 8,000 species of plants, over 200 species of mammals, including 81 bats, 110 species of snakes, thousands of insect species, and a rich diversity of birds. Peninsular Malaysia is also home to the Two-horned Sumatran Rhinoceros (*Didermocerus sumatrensis*). It is one of the last sites in all of Asia where The Malayan Tiger (*Panthera tigris*), the Asian Elephant (Elephas maximus), the Malayan Tapir (*Tapirus indicus*), and rhino still coexist.

One of the largest protected areas in Southeast Asia is Taman Negara National Park which covers 434,300 hectares of the Peninsular Malaysian Montane Rain Forests and the Peninsular Malaysian Rain Forests ecoregions. It is part of the Central Forest Spine (CFS) which has a total size of *ca*. 5.5 million hectares[17], and was concepted for tiger conservation during the Global Tiger initiative meeting in February 2012.

From 1954 to 2000[18], the forest cover in Peninsular Malaysia has decreased from 9.6 to 6.0 million hectares, equalling a decrease of almost 38%. The main threats to the forest areas in the Malay Peninsula are logging, both in the highlands and lowlands, conversion of lowland forest for agriculture, tourism development, mining, and road construction causing fragmentation and loss of forests in this ecoregion.

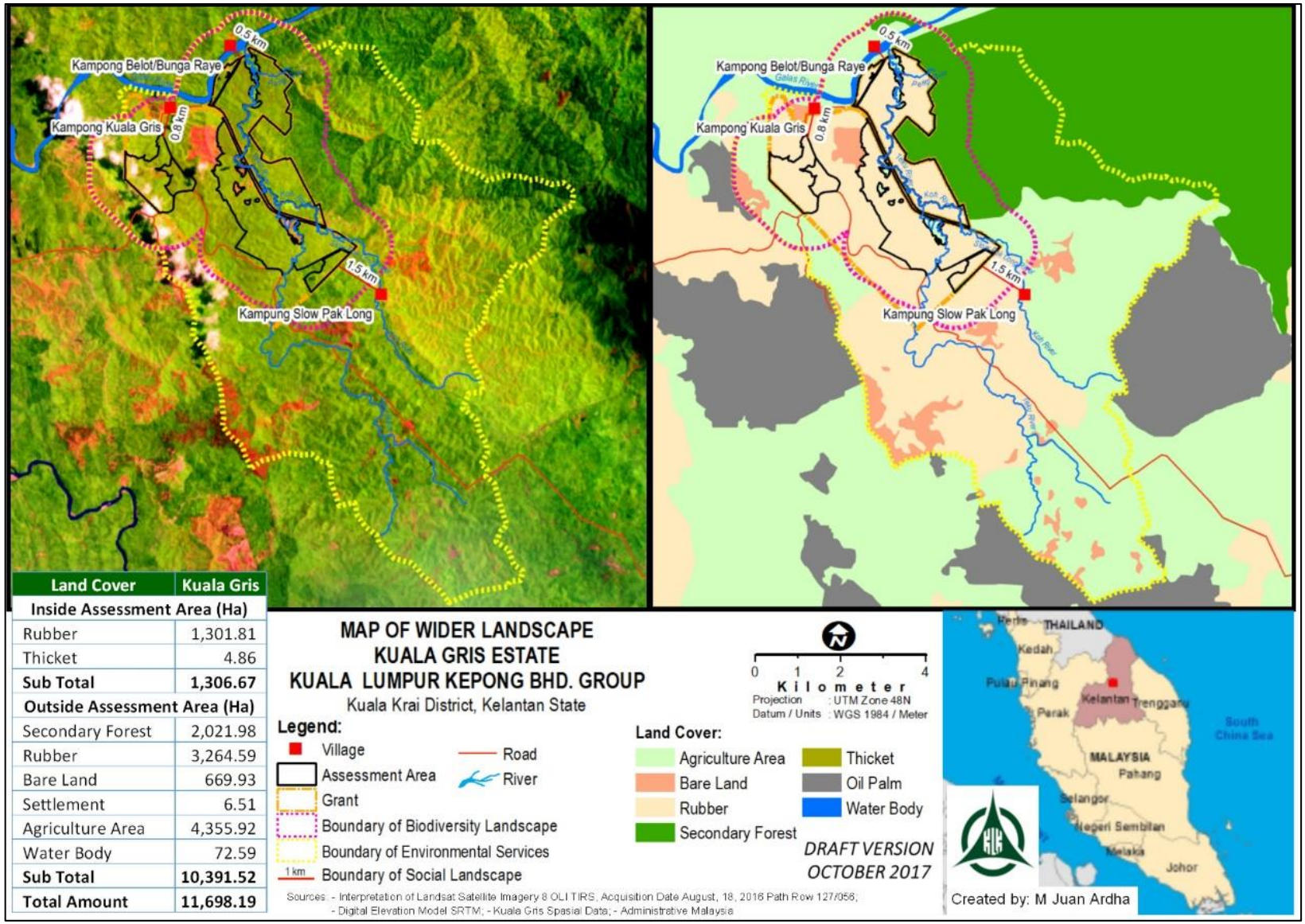
Landscape Context

Based on the legal status, assessment areas are located within agricultural development territory. Assessment area in Kuala Gris Estate were granted by the Federal Government to KLK as proxy in 1991 and 1998, while others in Kemasul Estate were granted in 1998. The land tenure takes form of Permanent Leased rights. The assessment area is located in rubber

[14] http://wwf.panda.org/about_our_earth/ecoregions/malaysian_lowland_forests.cfm
[15] http://www.keybiodiversityareas.org/site/mapsearch
[16] http://wwf.panda.org
[17] http://www.townplan.gov.my/content.php?ID=118
[18] http://greenwoodinternational.blogspot.co.id/2013/01/the-malaysian-central-forest-spine.html

fields managed by KLK. This way, rubber plantations along with their facilities are already developed along with the facilities including asphalt road and community settlement, complete with health and educational facilities. Based on spatial planning from the Federal Department of Town and Country Planning the assessment areas are located in an designated for agriculture area.

Based on satellite imagery interpretation (**Figure 4** and **Figure 5**), the land use of the wider landscape around the assessment area in Kuala Gris and Kemasul Estates consists of agricultural lands, i.e. oil palm and rubber plantations. However, there are some natural shrubs and thickets in the eastern and southern part of the assessment area in Kuala Gris Estate.



Land Cover	Kuala Gris
Inside Assessment Area (Ha)	
Rubber	1,301.81
Thicket	4.86
Sub Total	**1,306.67**
Outside Assessment Area (Ha)	
Secondary Forest	2,021.98
Rubber	3,264.59
Bare Land	669.93
Settlement	6.51
Agriculture Area	4,355.92
Water Body	72.59
Sub Total	**10,391.52**
Total Amount	**11,698.19**

Figure 4. Land cover map in assessment area of Kuala Gris Estate

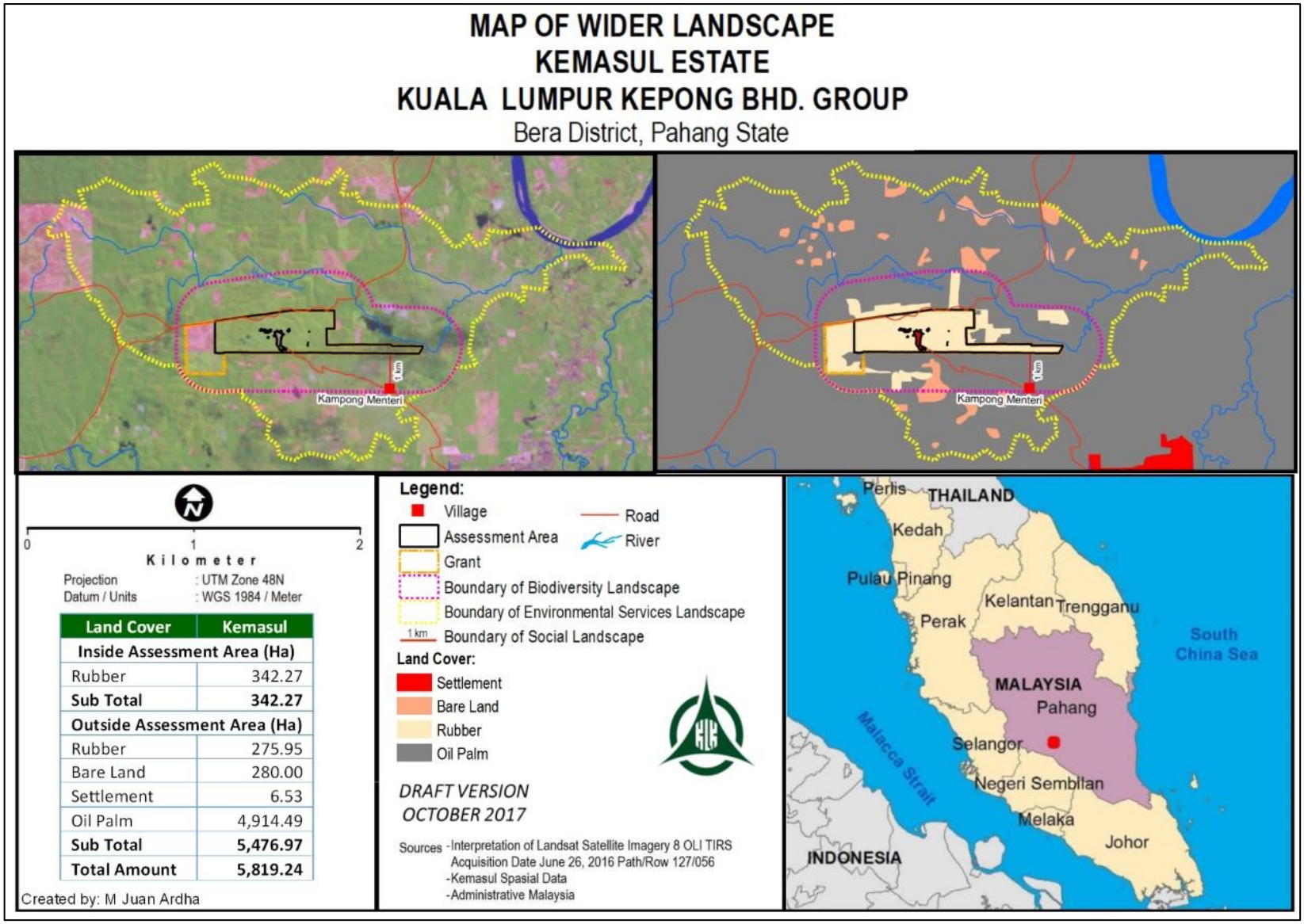


Figure 5. Land cover map in assessment area of Kemasul Estate

Biodiversity Context

Key Biodiversity Areas and Biodiversity Characteristics

Based on the IUCN RedList (IUCN, 2017[19]), the assessment area is a part of distribution range of several threatened species, including species which are Critically Endangered (CR), Endangered (EN), and Vulnerable (VU). The Sumatran Rhinoceros (*Dicerorhinus sumatrensis*) and Sunda Pangolin (*Manis javanica*) are Critically Endangered species. The Sunda Pangolin's natural distribution range includes the assessment areas. Endangered (EN) species which natural distribution ranges also include the assessment areas are Malayan Tiger (*Panthera tigris*), Malay Tapir (*Tapirus Indicus*), Asian Elephant (*Elephas maximus*), Siamang (*Simphalangus syndactylus*) and Lar Gibbon (*Hylobates lar*), while the Sun bear (*Helarctos malayanus*) and Asian Small-clawed Otter (*Aonyx cinereus*) are classified as Vulnerable (VU), as shown in **Table 2.3**.

Table 2.3. Existing RTE species according to IUCN global map

Species RTE	DWNP RedList Status	IUCN RedList Status	Kuala Gris Estate	Kemasul Estate
Sumatran Rhinoceros (*Dicerorhinus sumatrensis*)	CR	CR	-	-
Sunda Pangolin (*Manis javanica*)	VU	CR	○	○
Malayan Tiger (*Panthera tigris*)	EN	EN	○	-
Malay Tapir (*Tapirus indicus*)	NT	EN	-	○
Asian Elephant (*Elephas maximus*)	VU	EN	○	○
Siamang (*Symphalangus syndactylus*)	NT	EN	○	-
Lar Gibbon (*Hylobates lar*)	-	EN	○	○
Sun Bear (*Helarctos malayanus*)	VU	VU	○	○
Asian Small-clawed Otter (*Aonyx cinereus*)	-	VU	○	○

Source: http://maps.iucnredlist.org; & DWNP, 2010
Notes: ○= in global range (historically); - = not in range; CR = Critically Endangered; EN = Endangered; VU = Vulnerable

The mammal species distribution is detailed in the RedList of Mammals for Peninsular Malaysia (DWNP, 2010). There is discrepancy between the DWNP's threatened status and IUCN's global status (see **Table 2.3**). For example, the Sunda Pangolin (*Manis javanica*) is categorised as Critically Endangered (CR) according to IUCN's global distribution, while according to DWNP assessment the species is still considered Vulnerable (VU) in Peninsular Malaysia. This is also the case for the MalayTapir (*Tapirus indicus*), Asian Elephant (*Elephas maximus*), and Siamang (*Symphalangus syndactylus*), Lar Gibbon (*Hylobates lar*), and Asian Small-clawed Otter (*Aonyx cinereus*), where all DWNP RedList statuses come up with lower threatened level than the IUCN RedList.

The assessment areas are cut off from forest areas (**Figure 6**) by oil palm plantations and infrastructures around it, including highways and railways (**Table 6**). These assessment areas have been cut off of forest areas which are the main sources of biodiversity, for more than 50 years (*ca*. two cycles of oil palm plantings). The assessment areas do not provide any vital functions to support Biodiversity Conservation Areas.

Table 6. Conservation areas near the assessment areas

Forest Area Name	Assessment area	Distance to assessment area (km)	Position	Corridor	Remark

[19] http://www.iucnredlist.org/

Sungei Neggiri Wildlife Reserve	Kuala Gris	34	South-west	*N/A*	Separated by oil palm plantation, highways and railways
Tasek Bera Nature Reserve	Kemasul	12	South-east	*N/A*	Separated by oil palm plantation and highways

Source: WDPA Spatial Data, 2016

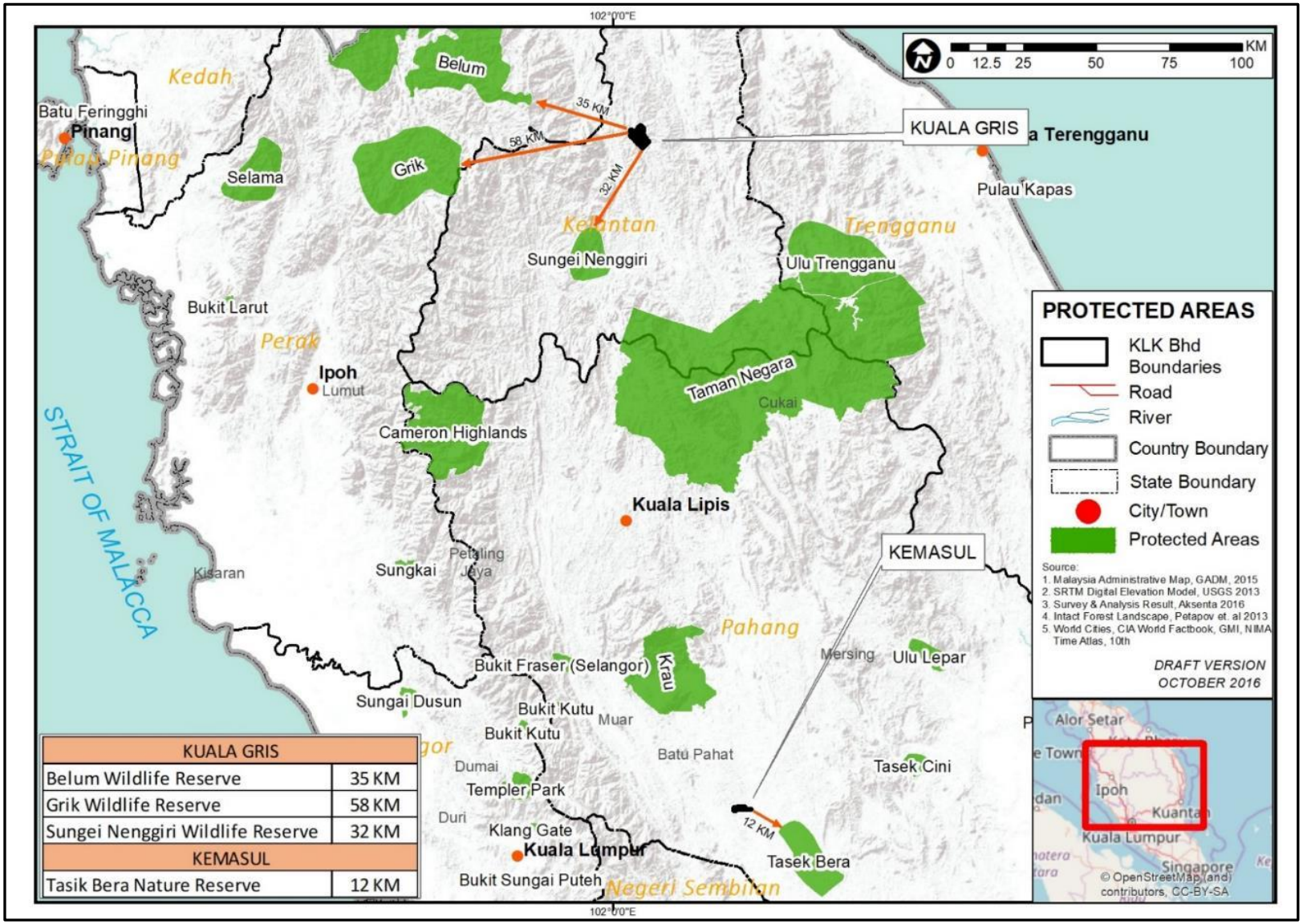


Figure 6. Protected areas in the wider landscape

Physical Context

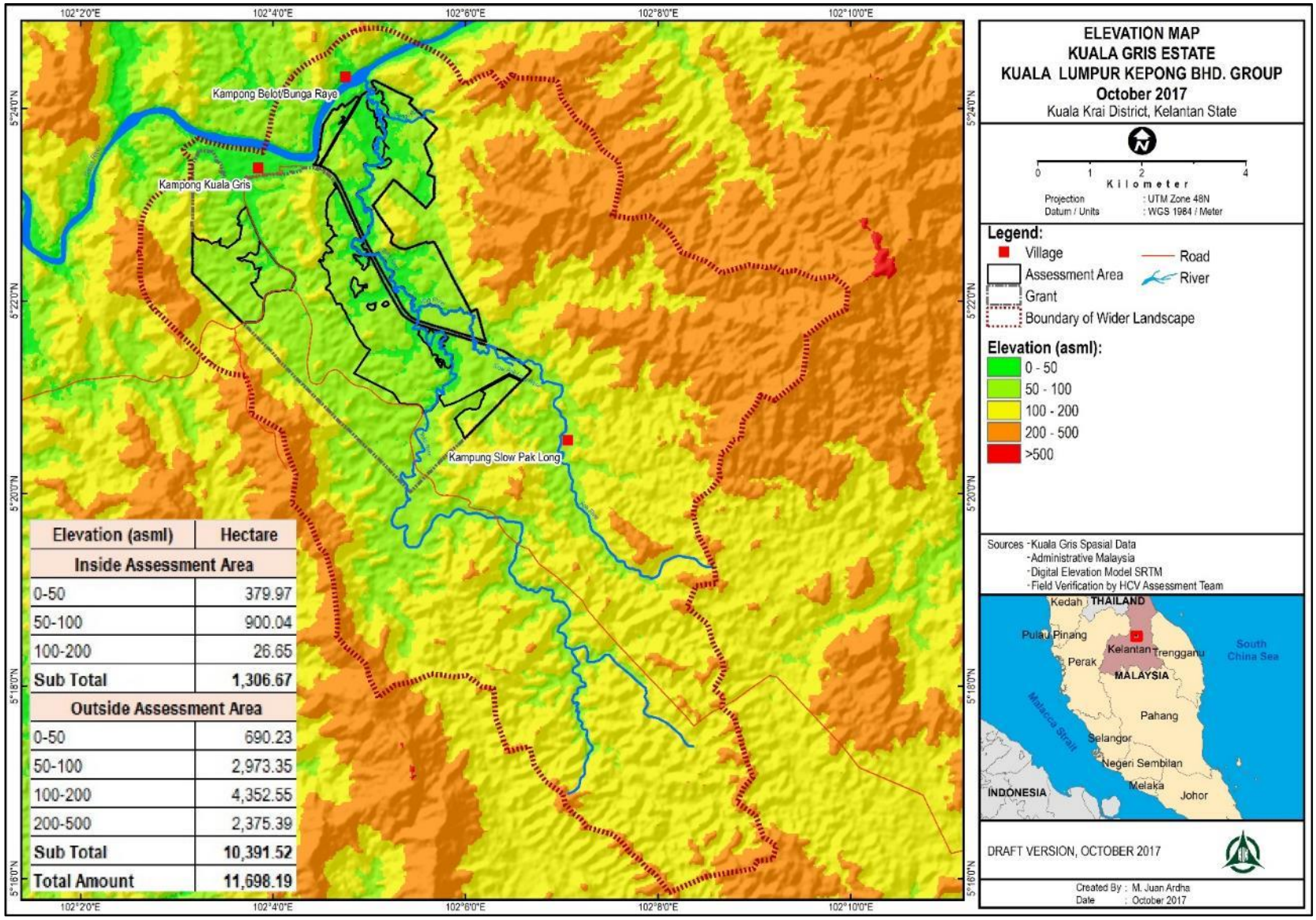
The assessment area is characterised with humid and hot tropical climate. Referring to Schmidt and Ferguson's climate classification, Kuala Gris Estate falls under climate Type A category (very wet), while Kemasul Estate under climate Type B category (wet). Average rates of annual rainfall in Kuala Gris and Kemasul Estates are respectively 3,000-3,500 mm/year and 1,500-2,000 mm/year.[20] Both estates share the same rainfall distribution pattern, i.e. year-round with two peaks of wet season in a year (April-May and November-December). Given such climate characteristics and rainfall condition, the vegetation and natural ecosystems that form in the assessment area are categorised tropical rainforest ecosystem. Both Assessment areas are situated in lowland of < 120 m a.s.l. elevation (**Figure 7** and **Figure 8**).

Their land physiographic conditions moderately vary from "flat" (0^0-5^o slopes) to "steep" in Kuala Gris (slope of >25^o), although only 0.52% of the total study area of 1,357 ha. Given such variations, gently undulating to hilly areas (5^o -20^o slope) are features that dominate both assessment areas (**Figure 9** and **Figure 10**). Therefore, assessment areas in Kuala Gris and Kemasul Estates naturally have high rate of soil erosion and surface run-off. However, terracing already implemented in these areas since the 1940's allows mitigation of risks from the erosion and run-off.

Soil types in Kuala Gris assessment area are dominated by Dystrudepts, Hapludults, Paleudults and Rengam (Kandiudox) soil series (**Figure 11**). As for the soils in Kemasul assessment area, they belong to Malacca/Tavy Association (Haplorthox/Kandiudults Association) soil series (**Figure 12**). These soil series have textures varying from sandy loam, clay, to silty clay prone to erosion. In addition they are also characterised with low infiltration and high surface run-off. However, none of Kuala Gris and Kemasul assessment area soil series is classified as marginal or fragile soil.[21]

[20] 2011-2016 measurement.

[21] Criterion 7.4 of RSPO P&C 2013 mentions that "*extensive planting on steep terrain, and/or marginal and fragile soils, including peat, is avoided."* Other than peat soil, soil types that are also classified marginal/fragile soil include sandy soil that normally is found in heath areas and acid sulphate soil normally found in tidal zones (see also Criterion 4.3, Indicator 4.3.6 of RSPO P&C 2013).



Elevation (asml)	Hectare
Inside Assessment Area	
0-50	379.97
50-100	900.04
100-200	26.65
Sub Total	**1,306.67**
Outside Assessment Area	
0-50	690.23
50-100	2,973.35
100-200	4,352.55
200-500	2,375.39
Sub Total	**10,391.52**
Total Amount	**11,698.19**

Figure 7. Elevation map of Kuala Gris Estate

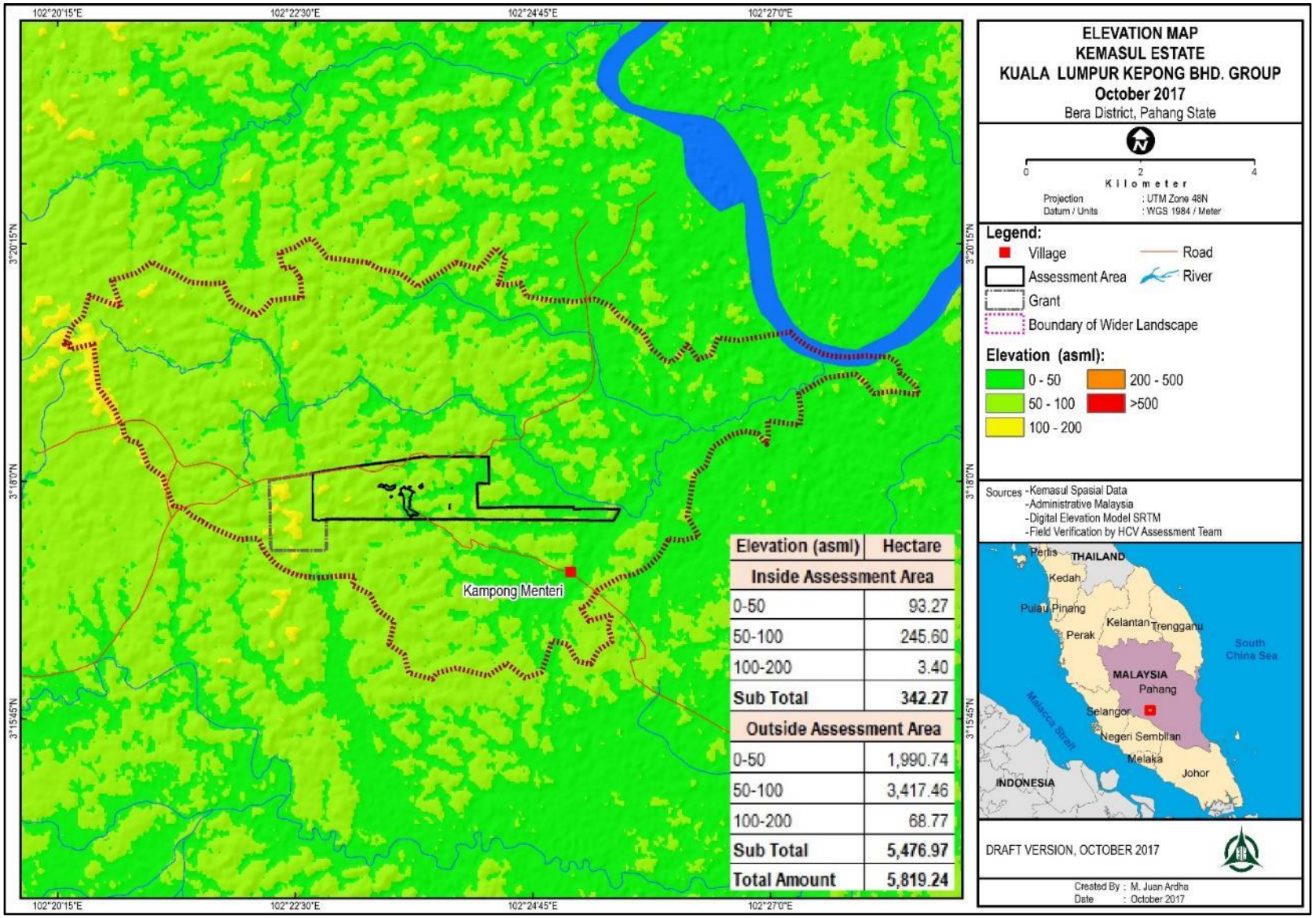
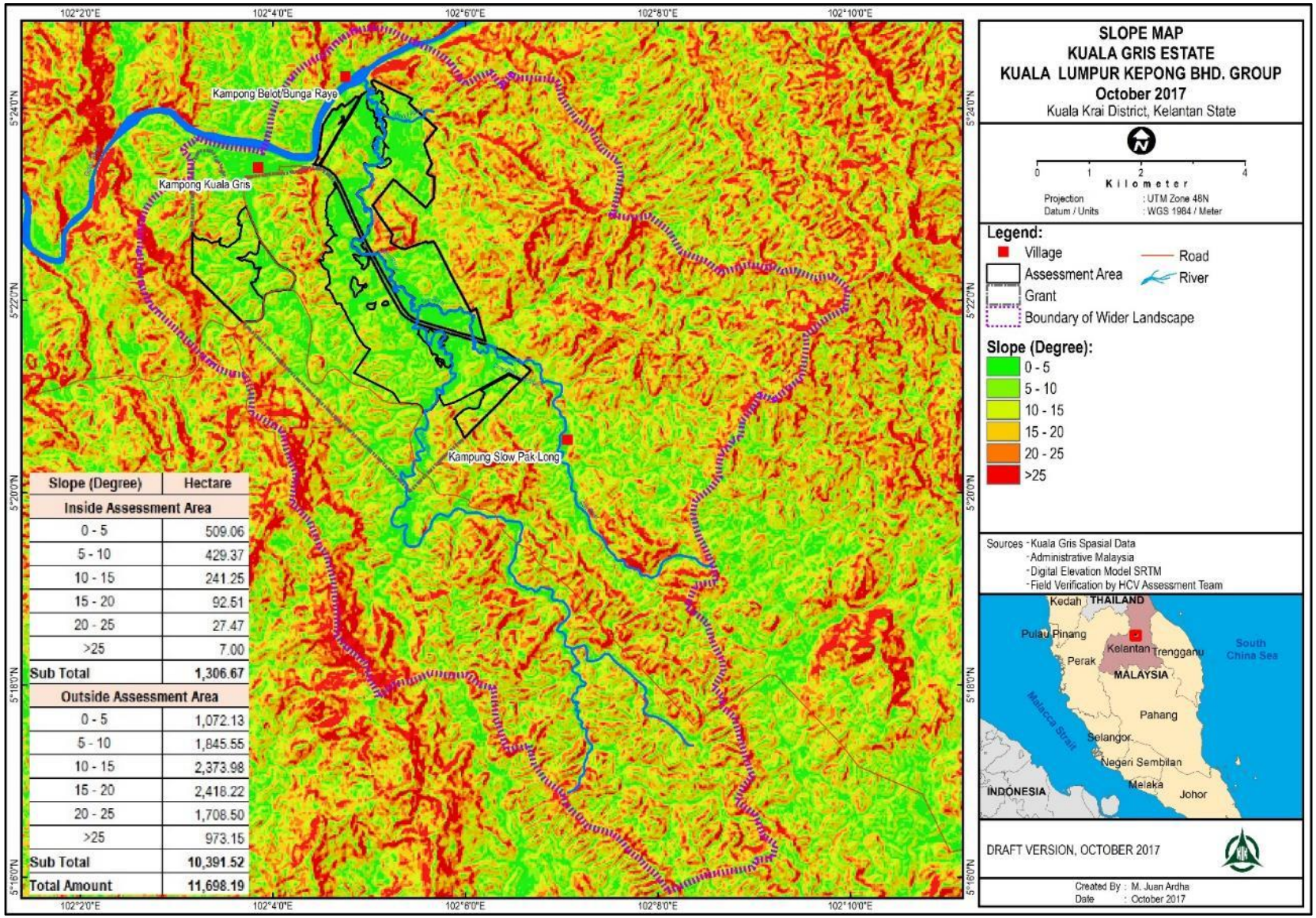
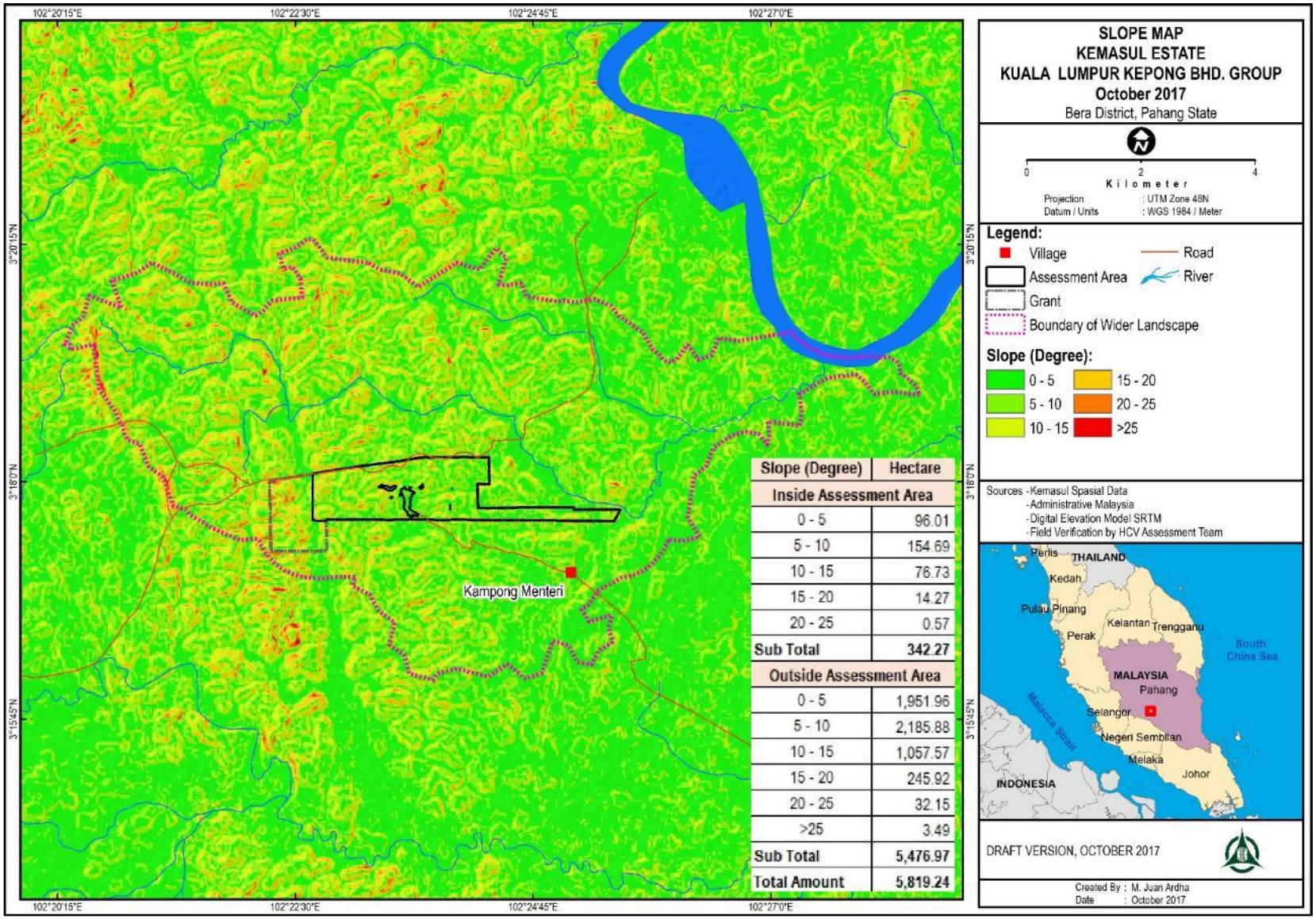


Figure 8. Elevation map of Kemasul Estate



Slope (Degree)	Hectare
Inside Assessment Area	
0 - 5	509.06
5 - 10	429.37
10 - 15	241.25
15 - 20	92.51
20 - 25	27.47
>25	7.00
Sub Total	**1,306.67**
Outside Assessment Area	
0 - 5	1,072.13
5 - 10	1,845.55
10 - 15	2,373.98
15 - 20	2,418.22
20 - 25	1,708.50
>25	973.15
Sub Total	**10,391.52**
Total Amount	**11,698.19**

Figure 9. Slope map of Kuala Gris Estate



Slope (Degree)	Hectare
Inside Assessment Area	
0 - 5	96.01
5 - 10	154.69
10 - 15	76.73
15 - 20	14.27
20 - 25	0.57
Sub Total	**342.27**
Outside Assessment Area	
0 - 5	1,951.96
5 - 10	2,185.88
10 - 15	1,057.57
15 - 20	245.92
20 - 25	32.15
>25	3.49
Sub Total	**5,476.97**
Total Amount	**5,819.24**

Figure 10. Slope map of Kemasul Estate

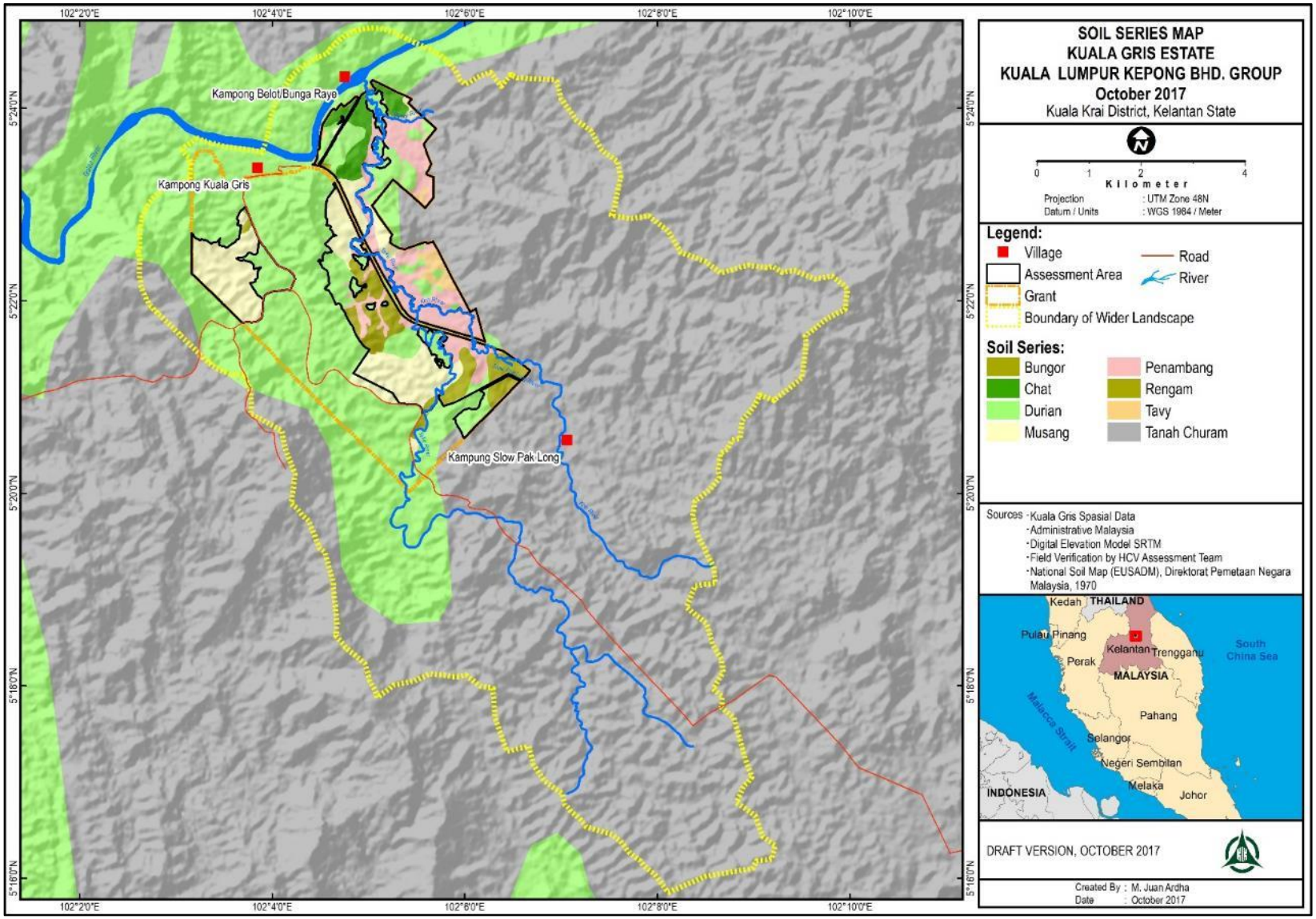


Figure 11. Map of soil series in Kuala Gris Estate

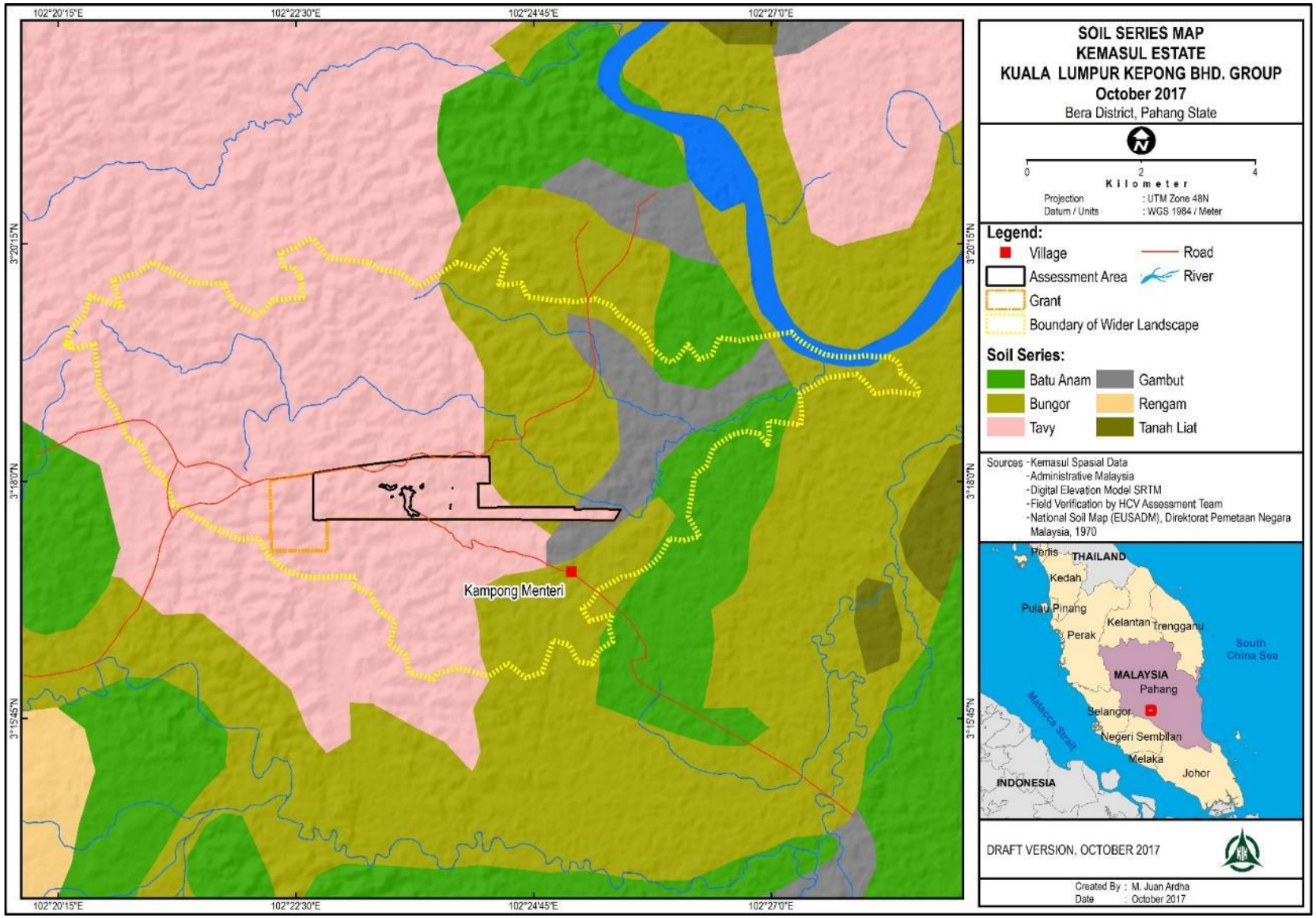


Figure 12. Map of soil series in Kemasul Estate

Socio-cultural Context

The communities near the assessment area in Kuala Gris Estate is Malay ethnic which Islam religious. They are use Malay to communicate and some people can use English. The Malay ethnic majority of Islam religion. The local government set Friday as a day off because Muslim communities pray at Mosque. The arrival of oil palm plantations in the area, more people migrated to the area seeking job opportunities. However, the Malay ethnic group is relatively open newcomers.

The communities near the assessment area in Kemasul Estate is Chinese ethnic which Buddhists religious. They are use Mandarin, Malay and English to communicate. The Chinese ethnic group is relatively open newcomers. They are community that familiar with oil palm plantation. Many local communities own oil palm plantation in this area.

The fundamental source of livelihoods for Malay ethnic around Kuala Gris Estate is intensive rubber plantation and working in rubber plantation. this is different with the Chinese ethnic, they mostly depend on oil palm plantations and working in industries sector.

The communities around assessment area is modern communities and not dependent on the forest areas. Villages that are located around assessment area has infrastructure and public facilities such as school, clinic, electricity installation and water installation. they are can access to market in nearest town, used car/motorcycle.

The only village that is not accessible by road is the Belut Village around Kuala Gris Estate, however the communities from Belut Village can access public facilities in Kuala Gris Village, they are directly border. No isolated community was found in the assessment area.

There are three villages including of one district that have interaction with the assessment area in Kuala Gris Estate, and one village that has interaction with the assessment area in Kemasul Estate. Based on their nativity, only one village can be considered as a native village, namely Kuala Gris Village. The native communities stated that this village which was founded a long time ago. Based on stakeholder consultation with local communities, it became evident that Kuala Gris Village was established before 1905, while other communities living near the assessment area consist of migrants who arrived at the time of plantation development (oil palm and rubber).

Currently, many local people from around the assessment area settled in the city, especially the youth. The main reasons for this are education and work. The distance of the village furthest from the assessment area is 1.38 km and the largest population is 1,200 people (**see Table 7**).

Table 7. socio-culture context of villages near the Assessment areas

Remark	Villages Interacting with Assessment Areas			
	Kuala Gris Estate			Kemasul Estate
Village Name	Belut	Kuala Gris	Slow Pak Long	Menteri
Distance to assessment areas	0.59 km	Directly border with Kuala Gris Estate	1.38 km	Directly border with Kemasul Estate
Population	12 houses and 50 people	300 houses and 1,200 people	89 houses and 499 people	66 houses and 200 people
Ethnic Majority	100% Malay ethinc		90% Malay and 10% Southern Thai	~100% Chinese ethnic (95% Chinese, 3% Indian, 2% others)

Remark	Villages Interacting with Assessment Areas			
	Kuala Gris Estate			Kemasul Estate
Religion Majority	Islam	Islam	Islam	Buddhism
Livelihood Majority	Smallholder of rubber plantation, 1 people working in Kuala Gris Estate	Smallholder of rubber plantation, 200 people working in Kuala Gris Estate	Smallholder of rubber plantation, 30 people working in Kuala Gris Estate	Smallholder of oil palm plantation and working in industry sector.
Housing condition	All houses are made of stone			
Source of water	Sourced from mountain in Belut Village (outside assessment area)	Sourced from Air Kelantan Sdn., Bhd.	Sourced from Air Kelantan Sdn., Bhd.	Sourced from Pengurusan Air Pahang Bhd.
Electricity	Sourced from Tenaga Nasional Berhad (TNB)			
Accessibility	Accessible only through Galas River	Accessible through Kuala Gris Estate and State roads	Accessible through Kuala Gris Estate and State roads	Accessible through Kemasul Estate road
Perception about oil palm plantation	We have seen the company (Kuala Gris Estate) change rubber to oil palm, but that's not a problem for us.	We are familiar with oil palm, in Kuala Gris Estate, oil palm has been intensively cultivated by the Taiko/KLK Bhd.	We are not sure about the Kuala Gris Estate, but we know they existed before this village existed and they have the license from state.	We are familiar with oil palm because we all oil palm smallholder and this has been going on for a long time

Sources: Interviews with local communities, 2016.

HCV Findings

The entire assessment area is situated in an agricultural area, as evidenced by the Permanent Land Lease documents (Freehold Grant). Kuala Gris Estate started operating since 1920 by the Duff Development Company Ltd, while Kemasul Estate started operating since 1940, by the British Company. Both areas are long-established plantations with mainly rubber, cocoa and oil palm plantings.

The HCV Assessment identified HCV 1, HCV 4 and potential of HCV 2 within the boundary of wider landscape, i.e. in and around the grant area of Kuala Gris Estate, KLK Bhd (Table 13). Kemasul Estate, consisting 100% of rubber plantings, with no natural vegetation remaining, and no rivers or streams flowing through it, has no HCV area.

The HCV areas in the grant area of Kuala Gris Estate consist of shrubs in riparian buffers, and rivers. The total size of HCV areas is ± 67.4 ha or equal to 4.96% of the total grant area. However, a secondary forest area is founded on boundary of wider landscape in Kuala Gris Estate.

The HCV areas in the grant area of Kuala Gris Estate (assessment area) consist of shrubs in riparian buffers, and rivers. The total size of HCV areas is ± 67.4 ha or equal to 4.96% of the total grant area. However, a secondary forest area is found on boundary of wider landscape in Kuala Gris Estate, this area defined as potential of HCV 2 outside grant area of Kuala Gris Estate with size 4,973.3 ha. The potential of HCV 2 outside grant area of Kuala Gris Estate overlapping with map of Central Forest Spine and Tiger Forest Lanscape, while some of the area inside grant area of Kuala Gris Estate are overlapping with map of Central Forest Spine and Tiger Forest Lanscape defined as HCV management area (944,8 ha). The HCV

management area can be developed to oil palm plantations (conversion/go area) but must apply recommendations from the HCV Assessment report. Table 13 and Figure 6 present details and location of the identified HCV Areas in the PPA Kuala Gris.

Table 13. Locations and indicative area of HCVA in Kuala Gris Estate PPA

ID	HCV Type	Location	HCV Element	Indicative Boundary	Area (ha)*
HCV Inside of Assessment Area (Grand of Kuala Gris Estate)					
01	1 and 4	Perigi River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	2.3
02	1 and 4	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	7.5
03	1 and 4	Slow Pok Long River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	0.6
04	1 and 4	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m (upstream) and 20 m (downstrea m) buffer along both sides of the river	55.2
05	1 and 4	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	1.8
Total Area of HCV (ha) inside of assessment area					**67.4**
Area of Kuala Gris Estate (ha)					**1,357,1**
Percentage of HCV Area (%)					**4.96**
	HCV Outside Assessment Area (Grand of Kuala Gris Estate)				
06	1 and 4	Galas River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	50 m buffer along the right side of the river	94.9
07	1 and 4	Koh River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of downstream river flow regime and water quality	10 m buffer along both sides of the river	80.4
08	1 and 4	Teku River	Presence of threatened species (Oriental Small-claw Otter, Malayan boxs Turtle Asiatic Softshelled Turtle), maintenance of	10 m (upstream) and 20 m (downstrea	11.4

ID	HCV Type	Location	HCV Element	Indicative Boundary	Area (ha)*
			downstream river flow regime and water quality	m) buffer along both sides of the river	
09	Potential of HCV 2	Secondary Forest	Secondary forest overlapping with Tiger Conservation Lansdcape and Central Forest Spine Maps.	Secondary forest area that is directly bordering to the Kuala Gris Estate	4,973.3
Total Area of HCV (ha) outside of assessment area					**5,160**

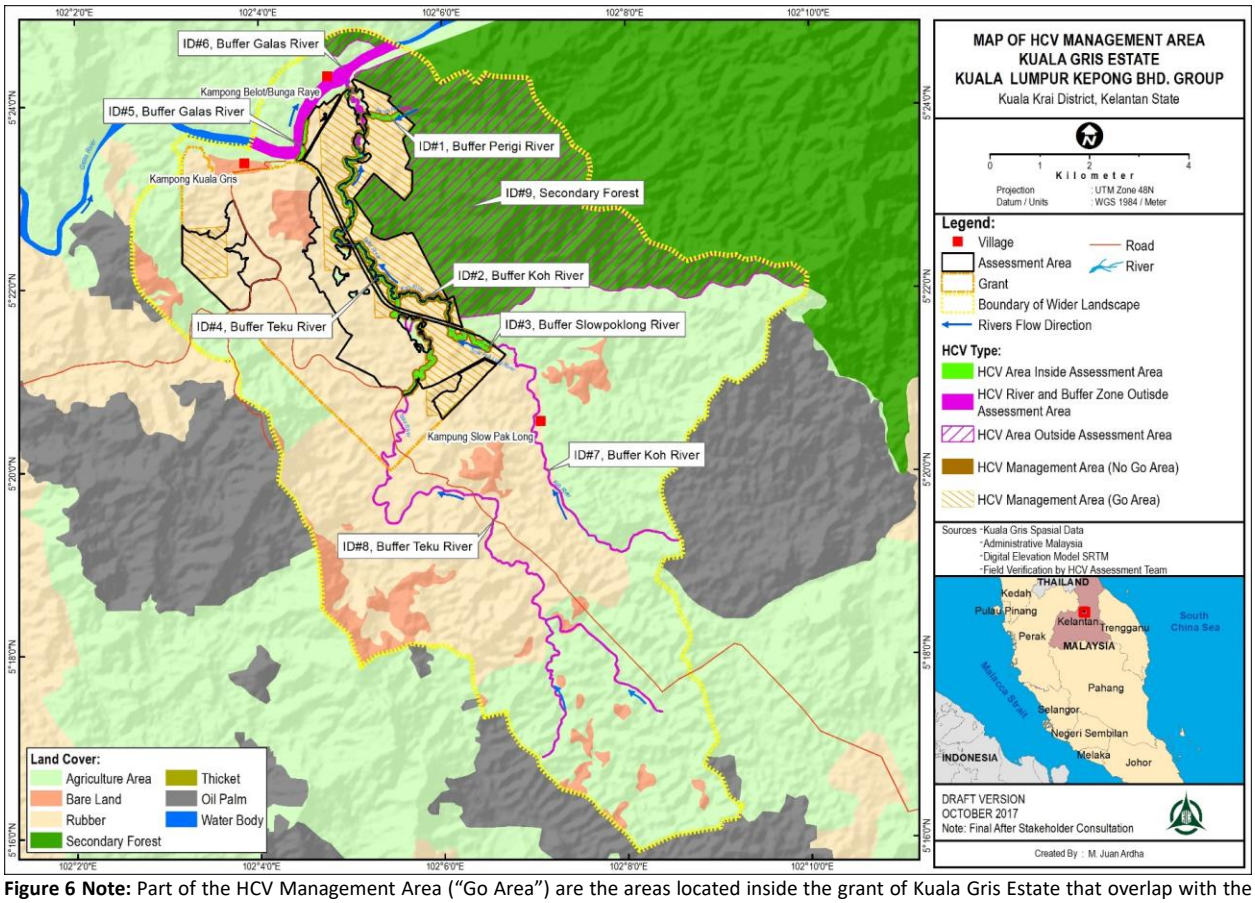


Figure 6 Note: Part of the HCV Management Area ("Go Area") are the areas located inside the grant of Kuala Gris Estate that overlap with the TCL and the CFS (HCV 2 indicators). These areas can be converted from rubber to oil palm plantations by following the recommendations in this report.

Stakeholder consultation

Consultations with stakeholders were carried out in order to gather information of the main interest for the assessment of the PPA. Public and private consultations were carried out with relevant stakeholders on 21 and 22 October 2016 (scoping study and participatory mapping), from the 23rd of October to the 1st of November 2016 (Participatory mapping, FGD and Interviews), from 28-30 October 2016 (Consultation to communicate the HCV identification results, as well as the threats, with relevant stakeholders such as community, local governments, academics, and NGOs, to consult local stakeholders about the validity of assessment findings and to collect additional data and information from all the stakeholders, and on the 31st of October 2016 (Meeting with TRAFFIC SEA in Kuala Lumpur, regarding Protected and Threatened Wildlife Species). Summary of the results of stakeholder consultations are presented in Table 14.

Large-scale stakeholder consultation meeting with representatives of the local communities, presenting the results of the assessment, was not carried out. According to representatives of the local communities around the Kuala Gris and Kemasul Estates, the concession areas of Kuala Gris and Kemasul Estates are not part of their daily life. The local communities showed no interest and do not feel disadvantaged over the development of the Estates, which the local communities considered to be entirely a corporate affair or corporate right. However, the assessment team do recommend the company to do some socialization (stakeholder consultation) regarding the results of the assessment with local communities around the estates, before developing any oil palm plantations.

Table 14. Summary of stakeholder consultation

Name – role – organisation/social Group	Key concerns & assessment team response
Chris Shepherd – TRAFFIC South-East Asia	• On the 31st of October 2016, a meeting was help with representative from TRAFFIC SEA to discuss trade issues, distribution of flagship species, and conservation concerns within and around the assessment area. Specifically, no species conservation issues exist regarding the intensive Rubber plantations of KLK which will be converted into Oil Palm, but in general, the oil palm companies should make sure that they provide safe passage for any species of wildlife passing through their plantations. Examples are Tapir, Elephant and Tiger. **Answer:** The information and suggestions which will enrich the HCV assessment report: This issue will be our concern while doing the HCV assessment in the Kemasul and Kuala Gris concessions.
H. Ibrahim Bin Husain – Kuala Gris Community Leader	• It is true that Kuala Gris Village had already been in the area before Kuala Gris Estate was established. Kuala Gris Estate land belonged to Kuala Gris Sub-District which the Sultan of Kelantan granted to Duff Development Company Ltd. as the proxy in 1907. • Kuala Gris Village was initially located by Galas River. Following the big flood in the 1950s, based on the arrangement between Kelantan Kingdom and Kuala Gris Estate, Kuala Gris village was relocated to a granted location in Kuala Gris Estate. • Taiko (KLK Group) took over Kuala Gris Estate from Duff Development in the region of the 1960s. Relationship between the local communities and Kuala Gris Estate went very harmoniously. Many community members worked for the estate. • The area of Kuala Gris Estate has been planted in rubber crops for a long time, therefore the potential existence of endangered species is only Oriental Small-claw Otter, Malayan Box Turtle Asiatic soft-shelled Turtle. The species is still found on the river Sungei Periigi, Teku, Koh and Sungei Slow Poh Long. **Answer:** The information and suggestions which are considered valuable to the report: This information will be used as a reference in our report, mainly related existence HCV areas in Kuala Gris Estate. This is evidence that Kuala Gris Estate is plantation that have been established since 1907 with oil palm, rubber and cocoa commodities.
Abdullah Bin Cek Ngoh – Head (JKKK) of Belut Village	• Belut Village was established following the presence of Kuala Gris Estate. This village was initially a part of Kuala Gris Village whose population was dominated by migrant communities who initially worked for Kuala Gris Estate. • The Kuala Gris Estate is located outside Kampung Belut village and to the east of Kuala Gris Estate there is forest reserve. The condition of the forest reserve is still quite good. Siamang still found in the forest reserve, it's just never entered the area of Kuala Gris Estate. **Answer:** This Information will be used as a reference on our report, verified that local community (Belut Village) around Kuala Gris estate depend on forest, however the forest is located outside Kuala Gris estate boundary and is not a corridor for Siamang.
Hamid Bin Harun – Head (JKKK) of Slow Pak Long Village *Cawangan*	Slow Pak Long Village was established following the presence of Kuala Gris Estate. Its communities were initially the estate's workers. Later on, they cleared forest for rubber cultivation and eventually settled down in the area.

Name – role – organisation/social Group	Key concerns & assessment team response
	Kuala Gris Estate has been planted in rubber crops since 50 years ago. At this time, there are no endangered species. The potential of HCV areas is only the river to the protection of environmental services. **Answer:** The information and suggestions are considered would enrich the report: verified Kuala Gris estate not forest and the areas potential to HCV areas is river and buffer.
Ho Koi – Ex Head (JKKK) of Menteri Village	Menteri Village communities were initially workers of and lived in Kemasul Estate (in the 1950s). Later on, they settled down outside the estate (the present day location). Since a long time ago they have always been absent in the use of natural resources and sacred sites within Kemasul Estate. The land cover at Kemasul Estate is a rubber crops. So there is no potential to the existence of endangered species. The potential of HCV areas is only the river to protection of environmental services. **Answer:** The information and suggestions are considered would be valuable to the report: this information confirms that assessment area has been developed 66 years ago.
Seca Gandaseca Assoc. Professor of Forest Engineering, Forest Engineering and Forestry Universiti Putra Malaysia	Condition of the land cover in Kuala Gris and Kemasul Estate is all rubber crops, and so there is no longer the potential of endangered species. The policy of Malaysian government has allocated the area for cultivation crops. Areas of conservation value have been reserved as conservation areas and forest reserve. **Answer:** The information and suggestions are considered would be valuable to the report: This was confirmed that location of assessment area is cultivation crop.
S.Y. Wong, Media Relation, WWF Malaysia	The Kuala Gris and Kemasul Estate are not located in the range of endangered species in Malaysia. There is a recorded of the elephants in the northern part of the Galas River, but never entered to Kuala Gris Estate. In some rivers in Kuala Gris Estate potentially found the Oriental Small-claw Otter, Malayan box's Turtle Asiatic Soft shelled Turtle. **Answer:** The information and suggestions are considered would be valuable to the report: This was confirmed that location of assessment area founded several of tortoise.
Balu Perumal, Head of Conservation Department, Malaysian Nature Society	Kuala Gris and Kemasul Estate are outside the area of Important Bird Area (IBA) and Endemic Bird Area (EBA), so the area is covered only rubber crops and scrubs. The area is also located outside the protected area network in Semenanjung Malaysia. **Answer:** The information and suggestions are considered would be valuable to the report.

Note: *This stakeholder consultation not final result and all concerns of stakeholder was included in the management recommendation*

4.1.2. Several issue which might threaten the HCV area

Threat assessment was carried out to identify the most urgent and severe threats to HCVs, as well as threats that are easy and feasible to mitigate. This process provides the basis for creating priorities in HCV management and will become the basis for rapid response to threats. Threat analysis was adapted from the IUCN Threat Impact Scoring System[22], and The Nature Conservancy's Threat Ranking System (Salzer, 2007).

Result of the threat assessment for each of the identified HCVs includes potential impacts which vary from "Low Risk" to "Very High Risk" (Table 15). Threats to HCV 4 are relatively more varied compared to those of other HCV types. Most of these threats, which contribute to pressures, originate from external sources. This may be due to at least two factors: (i) HCVAs identified are 'open access' areas; (ii) several HCVAs are yet to be under company management because compensation have yet to be paid. However, human

[22] http://s3.amazonaws.com/iucnredlist-ewcms/staging/public/attachments/3124/dec_2012 _guidance_on_ threat_impact_scoring.pdf

disturbance is considered low because these areas are located relatively far from local settlements and, to the date of this assessment, no human disturbance has been observed in the HCV areas.

Table 15. Summary of threat assessment on the identified HCVs

Current conditions/ pressures	Potential impact on HCV	Causes/Sources (likely contribution to pressure)	Remarks
HCV 1			
Decline in RTE flora and fauna species	**Low Risk**	Hunting, poaching, and trapping	Not a significant factor at present
Reduction in habitat quality	**Medium Risk**	Use of agrochemicals, conversion of riparian buffers	Potential excessive use of agrochemicals
Loss of feeding resources/ over-exploitation of prey biomass	**Medium Risk**	Use of agrochemicals	Potential excessive use of agrochemicals
Degradation of vegetation in riparian buffers, or reduced size of HCVA	**Low Risk**	Over clearing by land clearing contractors due to unclear HCVA boundaries.	Particularly in tributaries such as Perigi and Slowpoklong Rivers
HCV 2			
Potential degradation of secondary forest areas (HCV 2) outside the concession area	**Low Risk**	Over clearing by land clearing contractors due to unclear HCVA boundaries, and logging by third parties.	Particularly in the secondary forest area adjacent to the eastern boundary of Kuala Gris Estate
Wildlife-human conflict inside the HCVMA (including tiger)	**Low Risk**	Plantation workers and outside hunters	Workers are aware of potential presence of wildlife species, an additional SOP on mitigation will be prepared; no tigers have been recorded in this area for over 30 years
HCV 3			
Not Present	**None**	Not Relevant	Not Relevant because HCV 3 area was not present
HCV 4			
Declining river water quality	**Medium Risk**	• Result of soil erosion and fertiliser, herbicide and pesticide application residual carried by surface runoff • Riverbank morpho-erosion	• Especially during rainy seasons, in Kuala Gris Estate • Riverbank landslides are commonly found in Teku and Koh Rivers
Potential land conversion in riparian buffers	**Low Risk**	• Over clearing by contractors because HCV boundaries are not appropriately or well-marked on the ground • Community agriculture activities	• particularly along riverbanks in Kuala Gris Estate • Mainly tributaries such as Perigi and Slowpoklong Rivers
Riverbank morpho-erosion	**High Risk**	• Very high level of water discharge, particularly during wet seasons. • Soil texture is dominated by sandy clay easily eroded during big flow. • Currently no vegetation is found to reinforce riverbank.	• Riverbank morpho-erosion by natural river fluctuations; high potential in Kuala Gris Estate • Riverbank landslides are commonly found in Teku and Koh Rivers
HCV 5			
Not Present	**None**	Not Relevant	Not Relevant
HCV 6			
Not Present	**None**	Not Relevant	Not Relevant

The identified threats are potential to affect one or more of HCV elements since they threaten HCV Areas containing one or more HCV types. The threats to the riparian buffers can have impact not only on HCV 4, but also HCV 1. The stresses/ threats caused by local communities are Low Risk, those potentially caused

by the company during the process of conversion of the Rubber Plantations into Oil Palm are considered Medium Risk, and the only high risk is currently caused by external and/or natural factors, namely the fluctuation of the water level in the rivers and the structure of the soil. These identified threats will provide direction for future HCV management and monitoring (Table 16).

Table 16. Summary of main threats based on the elements of the HCVs

HCV	Summary of HCV in the Assessment Area	Main Threats
1	Presence of threatened species, including Oriental Small-claw Otter and Malayan Box Turtle	• Decline in RTE species due to poaching. • Degradation of vegetated riparian buffer area as aquatic wildlife habitat.
2	Smaller areas that provide key landscape function such as connectivity and buffering	• Potential degradation by land clearing contractors due to unclear HCVA boundaries
	Potential of tiger movements through the plantation	• Wildlife-human conflict inside the HCVMA (including tiger)
4	Managing water quality characteristics	• Potential land conversion along riverbanks • Decline in water quality due to intense surface runoff • Potential excessive use of agrochemicals
	Provide clean water	
	Protection of downstream river regime relating to the river base flow	• Reduced vegetated area and/or quality in catchment areas • Potential land conversion.

4.2. SEIA (social and environmental impact assessment)

There are several hypothetical impacts that will emerge (table 18), but none of those is critically important. The impacts are mainly physical related to land cover change and soil tillage, such as runoff, soil erosion, and sedimentation in the streams. Temporarily loss of land cover will slightly affect the movement of certain species of wildlife that use rubber plantation as a shelter. Socio-economic impact is mainly on the employees due to the change of types of the jobs. Tapping, for example, is no longer needed in oil palm plantation, so that tappers potentially loss their job unless they are willing to acquire new skill needed in oil palm plantation.

Table 18. Hypothetical Impacts of Conversion Activity

No	Activity	Occurring impact	
		Direct	Byproduct
1. Preparation			
1.1	Determining borders of converted area and signpost installation.	None	None
1.2	Measuring land slope	None	None
1.3	Seedling preparation	None	None
1.4	Pre planting spraying	None	None
2. Construction / development			
2.1.	Census of trees to be cut down.	None	None
2.2.	Cutting down rubber trees	(-) Changes in land cover (-) Increase in surface runoff (-) Increase in erosion	(-) Increase in surface runoff (-) Decrease in infiltration (-) Decrease in soil water content and increasing land drought potential in the converted area (-) Increase in sedimentation and flooding potential in downstream
2.3.	Collecting and piling fallen trees	(+) Faster decomposition	(+) Increase in soil fertility

No	Activity	Occurring impact	
		Direct	Byproduct
		(+) Erosion can be controlled through water interception at log piles (+) Controlling surface runoff	(-) Causing puddle and clogging if minced woods are carried by water. Thus, disturbing other activities. (+) Maintaining soil moisture and fertility.
2.4.	Making field markers (e.g. stake/peg)	(+) Absorbing permanent workers.	(+) Helpers can be utilized
2.5.	Making roads, water tunnels, and bridges	(-) Increase in surface runoff (-) Road erosion (+) Producing good drainage (controlling surface runoff)	(-) Increase in sedimentation and flooding potentials in downstream (-) Decrease in water quality (-) Flooding prevention
2.6.	Ripping (plow/harrow)	(+) Increase in soil permeability (+) Increase in soil aeration (-) Increase in erosion potential (-) Increase in surface runoff (on area with different height/declining land).	(+) Increase in infiltration and soil water reserve (+) Soil fertility (-) Sedimentation
2.7.	Making ditches, chambering	(-) Erosion or ditch cliff avalanche (depend on soil texture). (+) Controlling surface runoff.	(-) Sedimentation and silting of water body (+) Flood prevention.
2.8.	Making terrace/platform	(+) Controlling erosion (+) Controlling surface runoff.	(+) Controlling sedimentation (+) Maintain soil fertility (+) Flood prevention.
2.9.	Making planting hole	(-) Increase in erosion if digged soils are left open. (+) Reducing surface runoff and increasing catchment.	(-) Sedimentation in water body; (-) Decrease in water quality. (-) Losing top soil (+) Increase in *water storage*.
2.10.	Making harvesting alleyway (between oil palm trees)	(-) Increase in erosion level (-) High surface runoff.	(-) Sedimentation in water body. (-) Decrease in water quality. (-) Losing top soil. (-) Accumulating flow in downstream region.
3 Planting			
3.1	LCC planting	(+) Controlling land erosion (+) Controlling surface runoff.	(+) Reducing sedimentation. (+) Maintaining water quality. (+) Controlling surface runoff rate.
3.2	Seedlings and fertilizing	(+) Controlling land erosion (+) Controlling surface runoff.	(+) Reducing sedimentation. (+) Maintaining water quality. (+) Controlling surface runoff rate. (-) Chemical washing (-) Increase in aquatic weeds population eutrophication (-) Water pollution

Source: Social and Environmental Impact Assessment Report (Aksenta, 2016)

4.3. Carbon stock and GHG assessment

Carbon Stock Assessment

There are two main land cover classes in the study area, namely rubber and thicket. Size of the tree (DBH) in the thicket land cover is relatively homogeny and the size of the area of thicket is small (0.3% of the study area), while the rubber land cover can be divided into five sub-classes according to its age.

Result of the up-scaling and biomass mapping shows that biomass of the thicket land cover is not diverse, while the biomass of the rubber land cover is directly proportional to its age classes. In addition, there are

other factors which potentially cause variations to the biomass of the rubber land cover i.e. density of the tree, type of the seeds (clone), and numbers of vacant area[23].

Carbon stock of the biomass was calculated accordingly with IPCC (2006), using the 47% fraction from weight of biomass. Results of the analysis show that (i) in PPA Kuala Gris, average value of biomass carbon for rubber land cover amounted to 37.7 Tons-C/ha and for thicket amounted to 48.0 Tons-C/ha; and (ii) in PPA Kemasul, average value of the biomass carbon from the rubber land cover amounted to 35.5 Tons-C/ha (table 19).

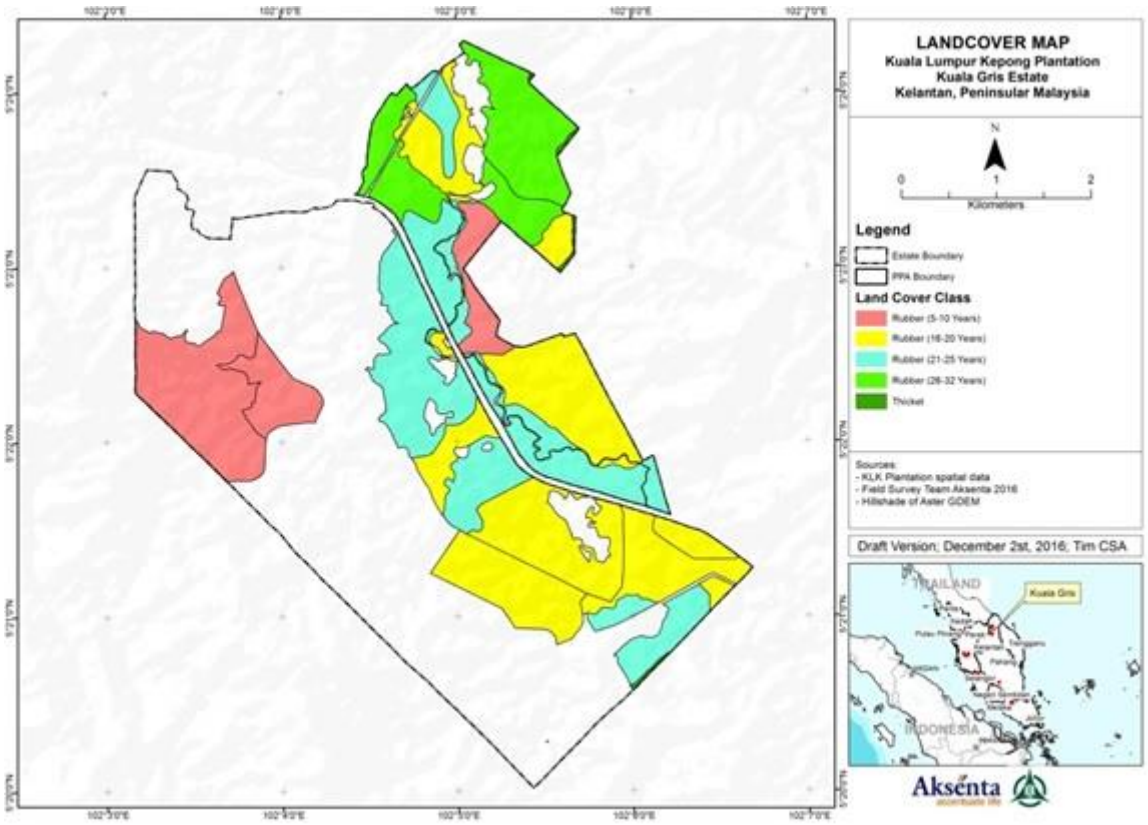


Figure 7. Land cover classification in PPA Kuala Gris

[23] Areas where rubber trees are dead because of white root disease or collapsed because of windfall. These areas are left unplanted to prevent spreading of the disease or recur of the windfall.

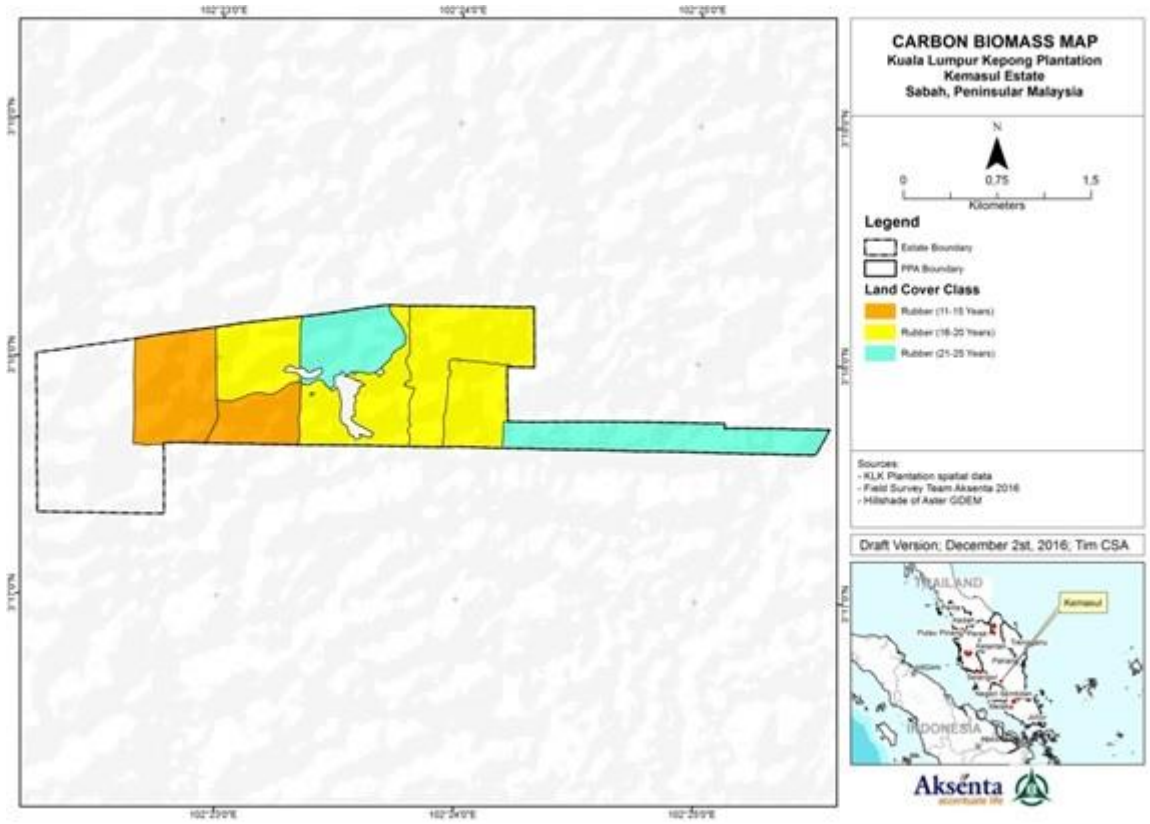


Figure 8. Land cover classification in PPA Kemasul

Table 19. Biomass and carbon stock per land cover in the PPAs of Kuala Gris and Kemasul Estates

Land Cover	Age Class (year)	Area		Biomass per ha (Tons/ha)	Biomass Total (Tons)	Carbon** per ha (Tons/ha)	Carbon** Total (Tons)
		(ha)*	(%)				
PPA Kuala Gris							
Rubber	5 to 10	256.9	18.9	32.3	8,285.4	15.2	3,894.1
	16 to 20	512.2	37.7	79.9	40,934.2	37.6	19,239.1
	21 to 25	386.1	28.5	90.7	35,030.6	42.6	16,464.4
	26 to 32	197.1	14.5	122.6	24,167.0	57.6	11,358.5
	Total of Rubber	**1,352.3**	**99.6**	**80.2*** **	**108,417.2**	**37.7*** **	**50,956.1**
Thicket	**-**	**4.9**	**0.4**	**102.1*** **	**496.6**	**48.0*** **	**233.4**
PPA Kemasul							
Rubber	11 to 15	80.0	23.4	61.4	4,910.1	28.9	2,307.7
	16 to 20	172.5	50.4	88.0	15,177.0	41.4	7,133.2
	21 to 25	89.8	26.2	64.5	5,794.1	30.3	2,723.2
	Total of Rubber	**342.3**	**100.0**	**75.6*** **	**25,881.2**	**35.5*** **	**12,164.1**

*) Area (ha) based on GIS calculation
**)Carbon is calculated accordingly to IPCC (2006) using 47% fraction from weight of biomass
***) Average value

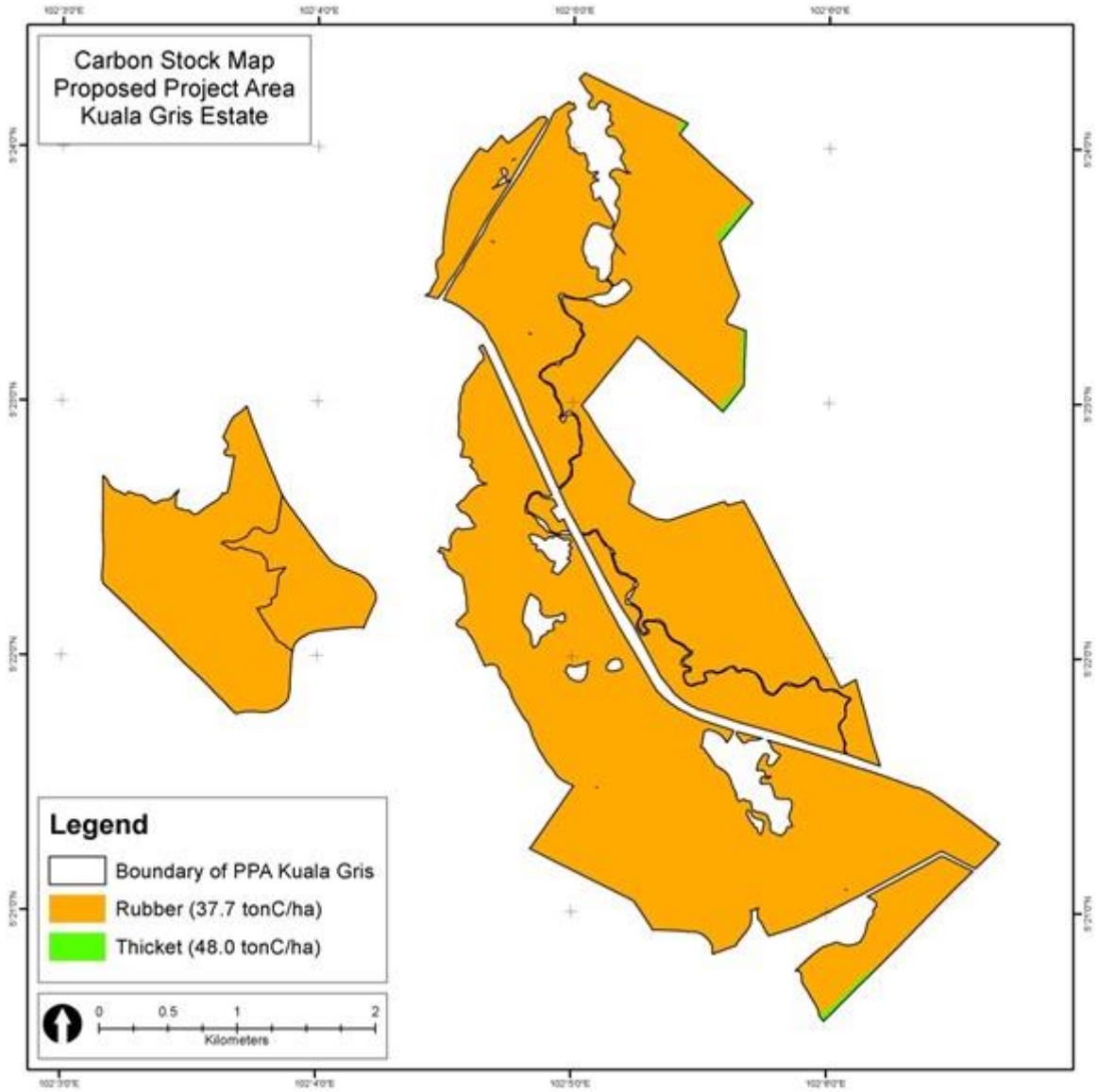


Figure 9. Carbon stock map of PPA Kuala Gris

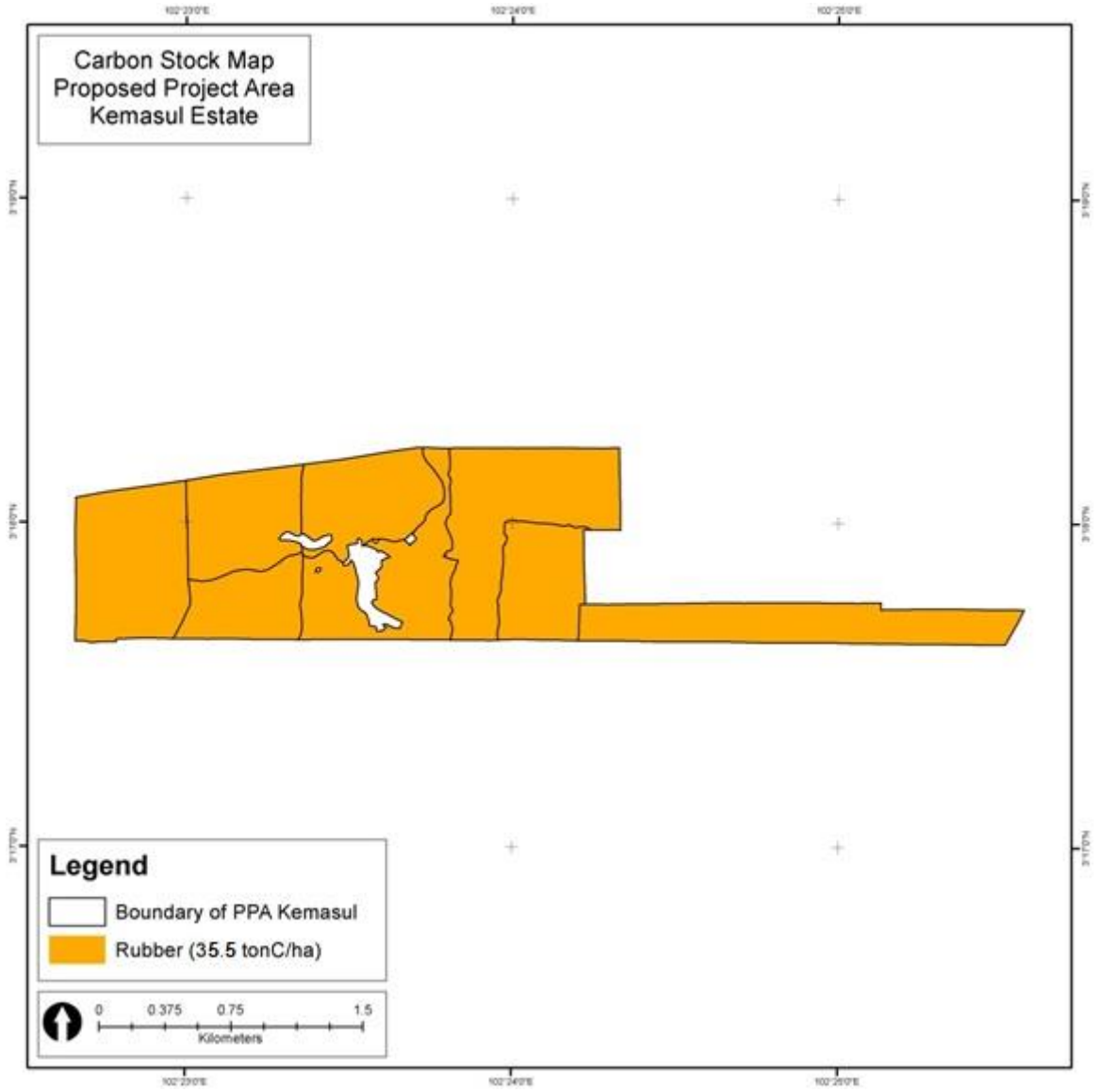


Figure 10. Carbon stock map of PPA Kemasul

Table 20. Average biomass carbon stock in the study area

Land Cover	Area (Ha)	Average* (Tons-C/ha)	Min (Tons/ha)	Max (Tons/ha)	Stdev (Tons/ha)	Total (Tons-C)
PPA Kuala Gris						
Thicket	4.9	48.0	48.0	48.0	0.0	233.4
Rubber	1,352.3	37.7	14.4	63.0	14.6	50,956.1
PPA Kemasul						
Rubber	342.3	35.5	18.8	50.1	9.4	12,164.1

*) Average biomass carbon stock including the above and below ground biomass
Source: Carbon Stock Assessment Report (Aksenta, 2016)

GHG Assessment

In order to implement mitigation of the GHG emission from the new development and the management plan of the PPAs, scenarios of the development and management plans are prepared. Two scenarios involving land use plan were prepared for the PPA Kuala Gris and three scenarios involving plans for the in-mill operations were prepared for the PPA Kemasul.

PPA Kuala Gris

Scenario to GHG emission mitigation for the PPA Kuala Gris involves a land use plan to set aside particular areas from the conversion program i.e. areas containing HCV/HCVMA (figure 6). Scenario involving in-mill management plan was not prepared for the PPA Kuala Gris. It is because the potential mill to receive FFB from the PPA Kuala Gris currently is not yet available to apply measures to reduce GHG emission from its process.

In comparison with the baseline scenario (will be referred to as scenario 1), the GHG emission mitigation (will be referred to as scenario 2) will decrease potential area for crop conversion program which would result decrease of the FFB production and crop sequestration from the new oil palm plantation. However, implementation of the scenario 2 would result lower projected GHG emission compare to the scenario 1. Details of development scenarios for PPA Kuala Gris are provided in table 21.

Table 21. Development scenarios for PPA Kuala Gris

Scenario 1 (baseline)	Development on all of the PPA		
Scenario 2	Set aside areas containing HCV/HCVMA to conservation land use from the development plan		
Development/management Plan		**Scenario 1**	**Scenario 2**
Area avoided for conversion program (ha)	HCV area	0.0	40.0
	Other conservation set-aside	0.0	0.0
	Total conservation area	**0.0**	**40.0**
Potential area for conversion program (ha)	Rubber	1,352.2	1,312.2
	Thicket	4.9	4.9
	Total conversion area	**1,357.1**	**1,317.1**
POME Treatment	Conventional Treatment (%)	100.0	100.0
	POME diverted to methane capture (%)	0.0	0.0
Electricity utilization	Export of excess electricity (kWh/year)	0.0	0.0
Biomass utilization	Sales of PKS for energy production (ton/year)	0.0	0.0
	EFB for electricity generation (%)	0.0	0.0
	EFB converted to compost (%)	0.0	0.0
	EFB for other uses (%)	0.0	0.0
	EFB applied directly to field (%)	100.0	100.0

Conservation set aside from the conversion program in the PPA would decrease the GHG emission from land use change (land clearing). At the same time, smaller effective area for future oil palm plantation would also decrease the use of other GHG emission sources in the in-field operations, i.e. use of fertilizers and field fuel. In addition, conservation area would also generate credit from its carbon sequestration. Projections of GHG emission from implementation of the development scenarios for PPA Kuala Gris are provided in table 22.

Table 22. Projected GHG emissions from implementation of the scenario 1 and scenario 2 for the PPA Kuala Gris

Scenario 1	**Development on all of the PPA**	
Scenario 2	**Set aside areas containing HCV/HCVMA to conservation land use from the development plan**	
Source of GHG emissions	**S1**	**S2**
Field emissions & credit (tonCO_2e)		
Land clearing	7,511.20	7,212.97
Crop sequestration	-12,042.47	-11,687.40
Fertilizers	4,752.24	4,612.12
N2O	702.88	682.15
Field fuel	180.20	174.89
Peat	0.00	0.00
Conservation credit	0.00	-100.03
Net Field Emission	**1,104.05**	**894.70**

Mill emissions & credit ($tonCO_2e$)		
POME	4,538.64	4,404.82
Mill fuel	8.96	8.69
Purchased electricity	747.05	747.05
Credit (excess electricity exported)	0.00	0.00
Credit (sale of PKS for power)	0.00	0.00
Net Mill Emission	**5,294.64**	**5,160.56**
Net Emission from Field and Mill ($tonCO_2e$)	**6,398.69**	**6,055.26**
Net Emission/Production ($tonCO_2e$/tonCPO)	**1.02**	**1.00**
Net Emission/Production ($tonCO_2e$/tonPKO)	**1.09**	**1.06**

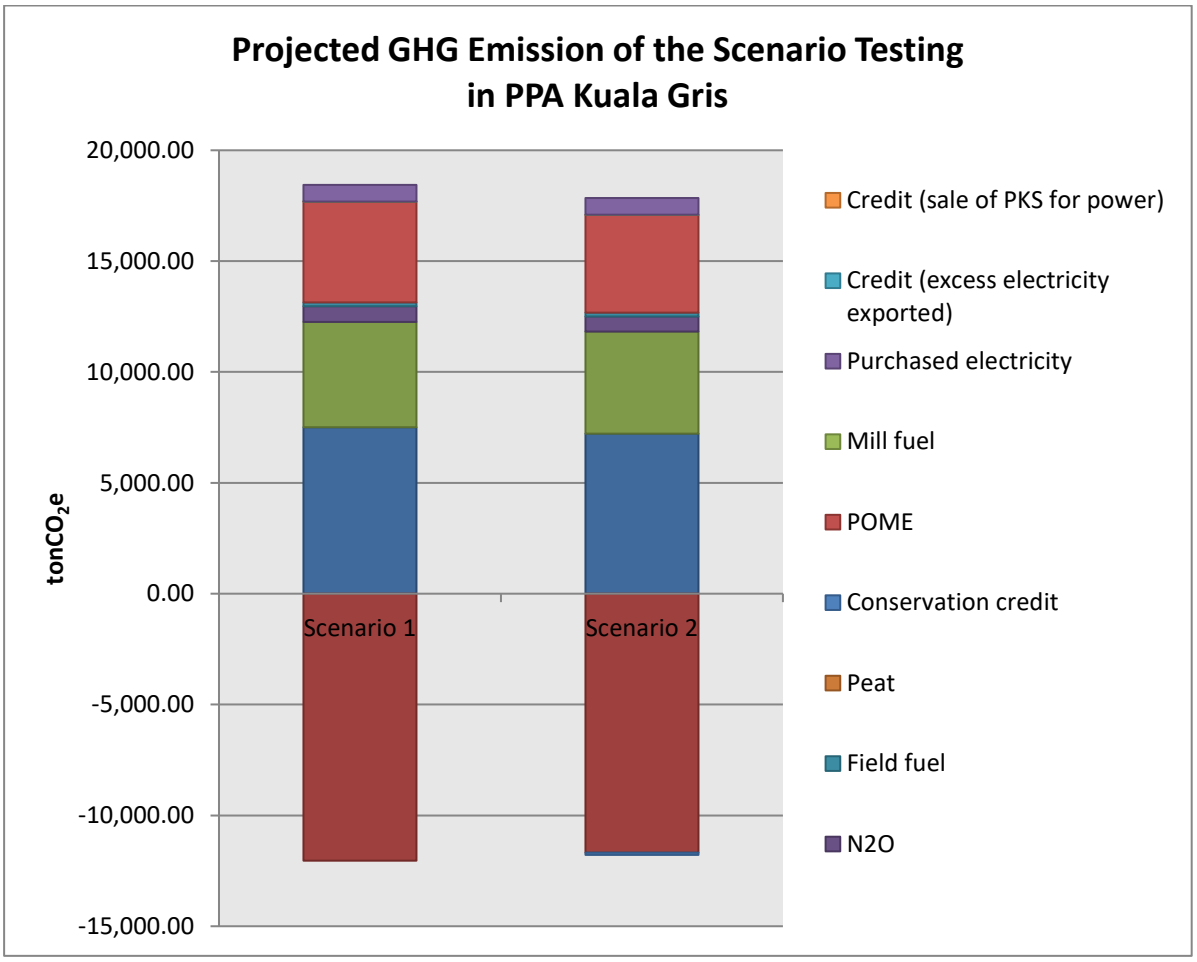


Figure 11. Chart showing the projected GHG emissions of the scenario 1 and scenario 2 for the PPA-Kuala Gris

Implementation of the scenario 2 to mitigate GHG emission for the PPA Kuala Gris will decrease effective area for production. However, projection of the net emission/production shows that this scenario is optimal in terms of mitigating GHG emission for palm oil production in PPA Kuala Gris. Therefore, scenario 2 is recommended to be selected as the GHG emission mitigation plan for the development plan for PPA Kuala Gris. Final development map and summary of GHG emission of the implementation of scenario 2 for PPA Kuala Gris are as presented respectively by figure 12 and figure 13.

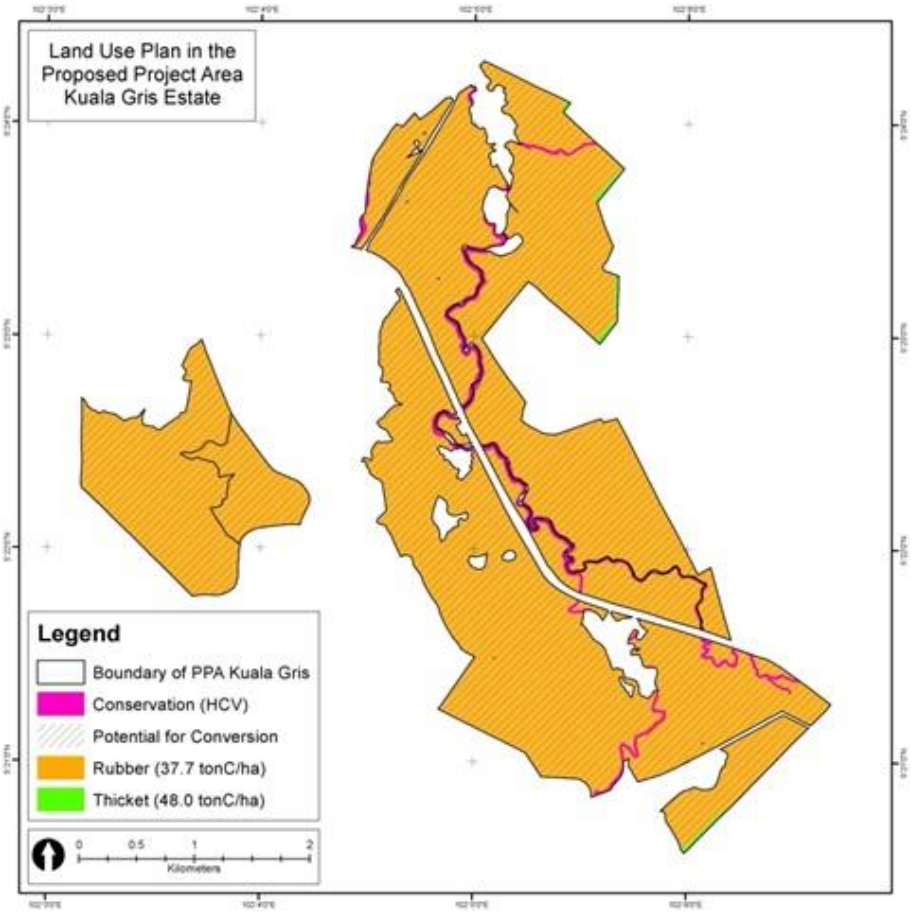


Figure 12. Final development plan to implementation of the scenario 2 for PPA Kuala Gris

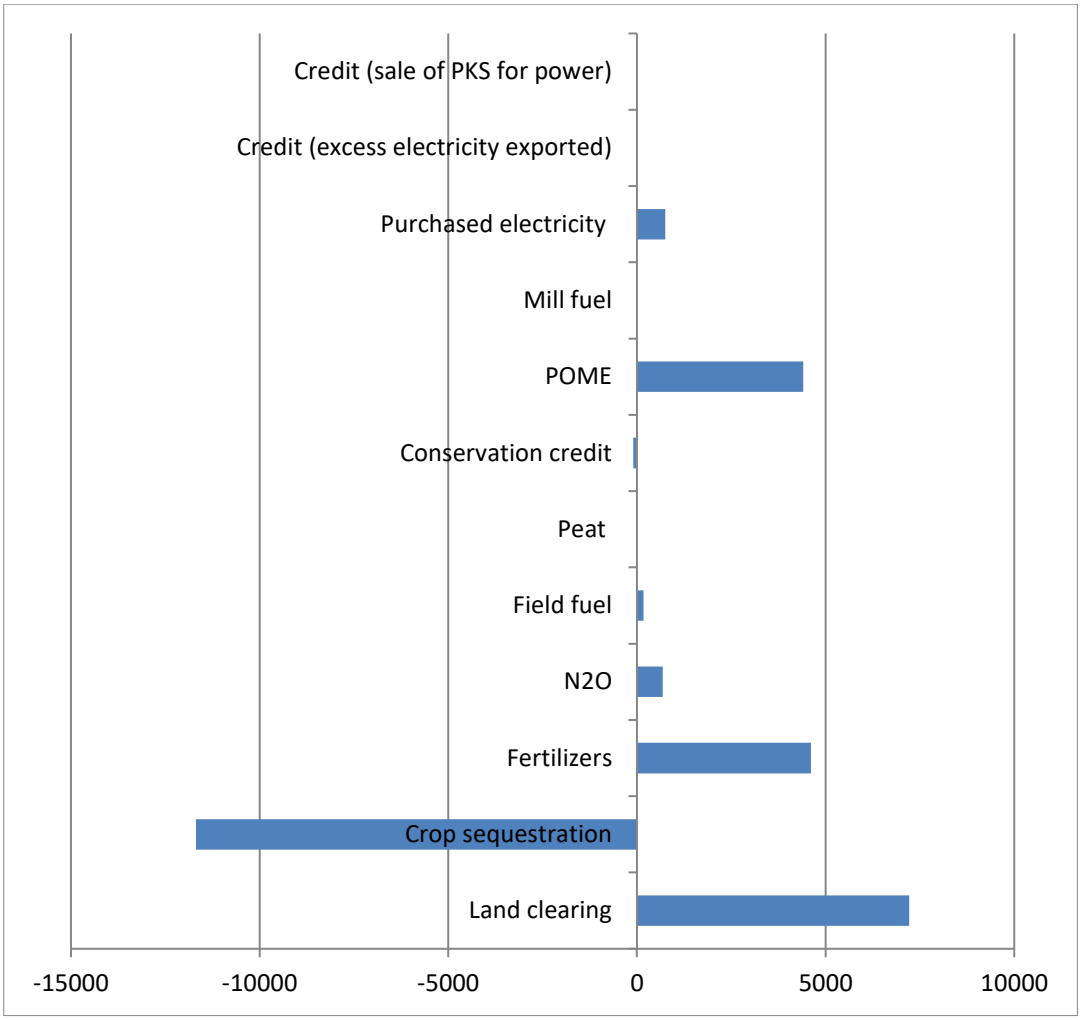


Figure 13. Summary of GHG emission from implementation of scenario 2 for PPA Kuala Gris

PPA Kemasul

Scenario to GHG emission mitigation for the PPA Kemasul involves management plans for the in-mill operations. The scenarios were developed accordingly with the availability of potential mills to receive FFB from the PPA Kemasul. Development scenario involving set aside area from conversion program (for conservation) is not relevant for PPA Kemasul, because there is no land cover containing high carbon stock and/or conservation values in the PPA Kemasul.

Scenario 1 involves a regular mill where advanced processing to GHG emission mitigation is not available, while the scenario 2 involves sales of biomass and scenario 3 involves partially diversion of POME to methane capture in addition to the sales of biomass. Details of development and management scenarios for PPA Kemasul are provided in table 23.

Table 23. Development and management scenarios for PPA Kemasul

Scenario 1 (baseline)	Default mill operation
Scenario 2	Sale of palm kernel shell
Scenario 3	Sale of palm kernel shell, and application of the 54% of the POME for methane capture and export the excess of the generated electricity

Development/management Plan		**Scenario 1**	**Scenario 2**	**Scenario 3**
Area avoided for conversion program (ha)	HCV area	0.0	0.0	0.0
	Other conservation set-aside	0.0	0.0	0.0
	Total conservation area	0.0	0.0	0.0
Potential area for conversion program (ha)	Rubber	342.4	342.4	342.4
	Thicket	0.0	0.0	0.0
	Total conversion area	342.3	342.3	342.3
POME Treatment	Conventional Treatment (%)	100.0	100.0	46.0%
	POME diverted to methane capture (%)	0.0	0.0	54.0%
Electricity utilization	Export of excess electricity (kWh/year)	0.0	0.0	5,396,835
Biomass utilization	Sales of PKS for energy production (ton/year)	0.0	1,031.0	1,031.0
	EFB for electricity generation (%)	0.0	0.0	0.0
	EFB converted to compost (%)	0.0	0.0	0.0
	EFB for other uses (%)	0.0	0.0	0.0
	EFB applied directly to field (%)	100.0	100.0	100.0

Utilization of mill-by products in scenario 2 and 3 as mitigation of GHG emission would decrease net GHG emission by gaining carbon credit. Instead of affecting effective area for FFB production, carbon credit from the implementation of scenario 2 and 3 are derived from utilizing the mill-by products as substitution for the fuel with higher GHG emission. Implementation of scenario 2 and 3 will not cause decrease gross productions of FFB and palm oil but will only improve optimization of the net emission/production.

Table 24. Projected GHG emissions of the implementation of the scenario 1, 2 and 3 for the PPA Kemasul

Scenario 1	**Default mill operation**
Scenario 2	**Sale of palm kernel shell**
Scenario 3	**Sale of palm kernel shell, and application of the 54% of the POME for methane capture and export the excess of the generated electricity**

Source of GHG emissions	**S1**	**S2**	**S3**
Field emissions & sinks (tonCO_2e)			
Land clearing	1,782.08	1,782.08	1,782.08
Crop sequestration	-3,037.18	-3,037.18	-3,037.18
Fertilizers	2,577.63	2,577.63	2,577.63
N2O	419.78	419.78	419.78
Field fuel	45.45	45.45	45.45
Peat	0.00	0.00	0.00
Conservation credit	0.00	0.00	0.00
Net Field Emission	**1,787.75**	**1,787.75**	**1,787.75**
Mill emissions & credit (tonCO_2e)			
POME	1,271.86	1,271.86	656.48
Mill fuel	7.31	7.31	7.31
Purchased electricity	715.32	715.32	715.32
Credit (excess electricity exported)	0.00	0.00	-3,623.22

Credit (sale of PKS for power)	0.00	-2,268.20	-2,268.20
Net Mill Emission	**1,994.48**	**-273.72**	**-4,512.31**
Net Emission from Field and Mill (tonCO_2e)	**3,782.23**	**1,514.03**	**-2,724.57**
Net Emission/Production (tonCO_2e/tonCPO)	**2.26**	**0.91**	**-1.63**
Net Emission/Production (tonCO_2e/tonPKO)	**2.16**	**0.86**	**-1.56**

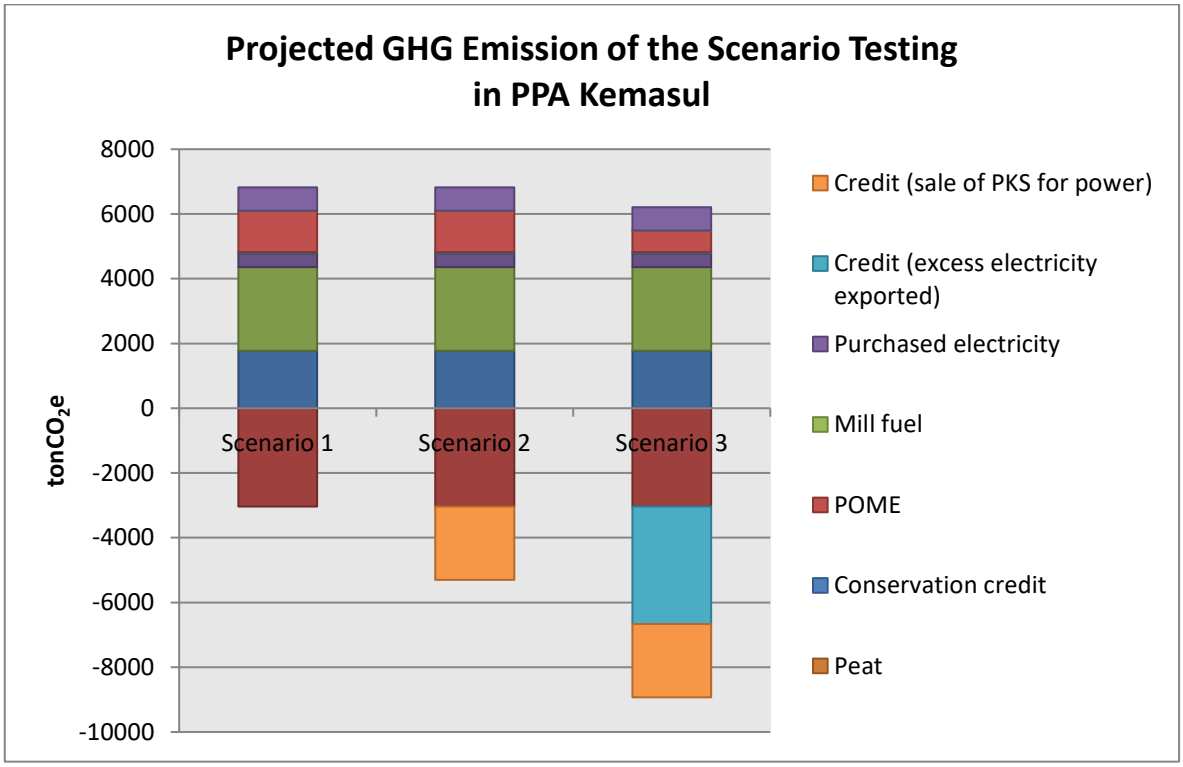


Figure 14. Chart showing the projected GHG emissions of the scenario 1, 2 and 3 for the PPA-Kemasul

Implementation of the scenario 3 for the PPA Kemasul shows significant decrease of the projected GHG emission by applying sales of PK, diversion of POME to methane capture, and export of excess electricity. Scenario 3 is recommended for the management plan of the PPA Kemasul to mitigate its GHG emission. Final development map and summary of GHG emission of the implementation of scenario 3 for PPA Kemasul are as presented respectively by figure 15 and figure 16.

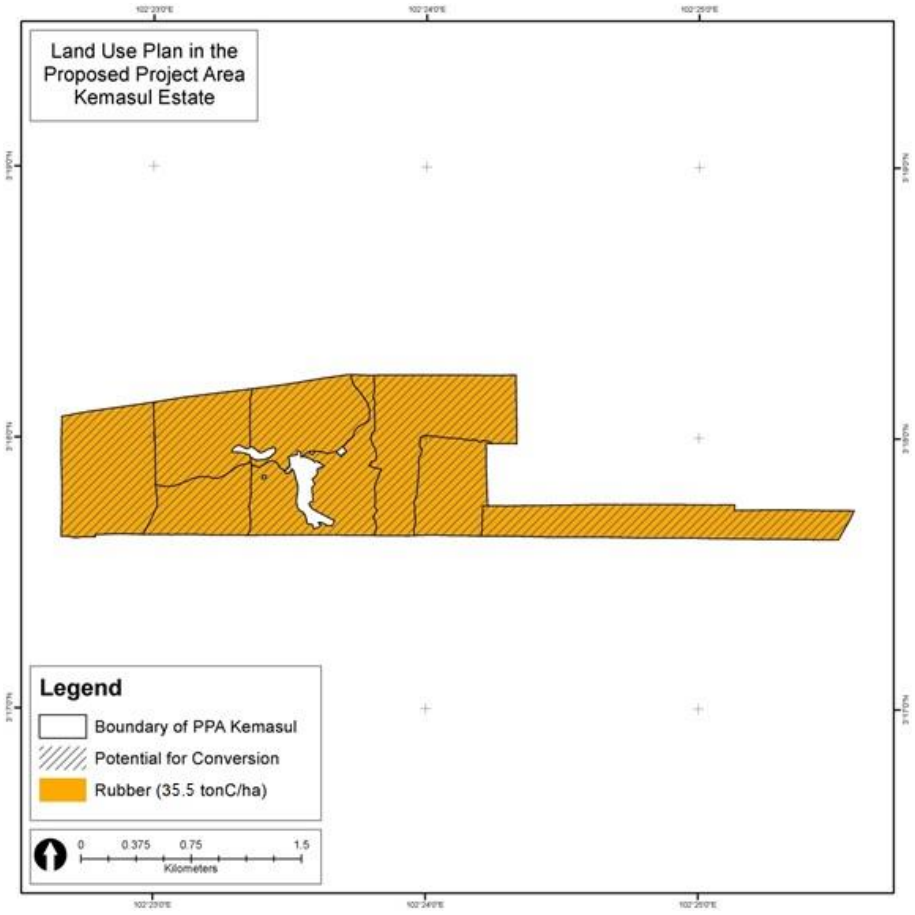


Figure 15. Final development plan to implementation of the scenario 3 for PPA Kemasul

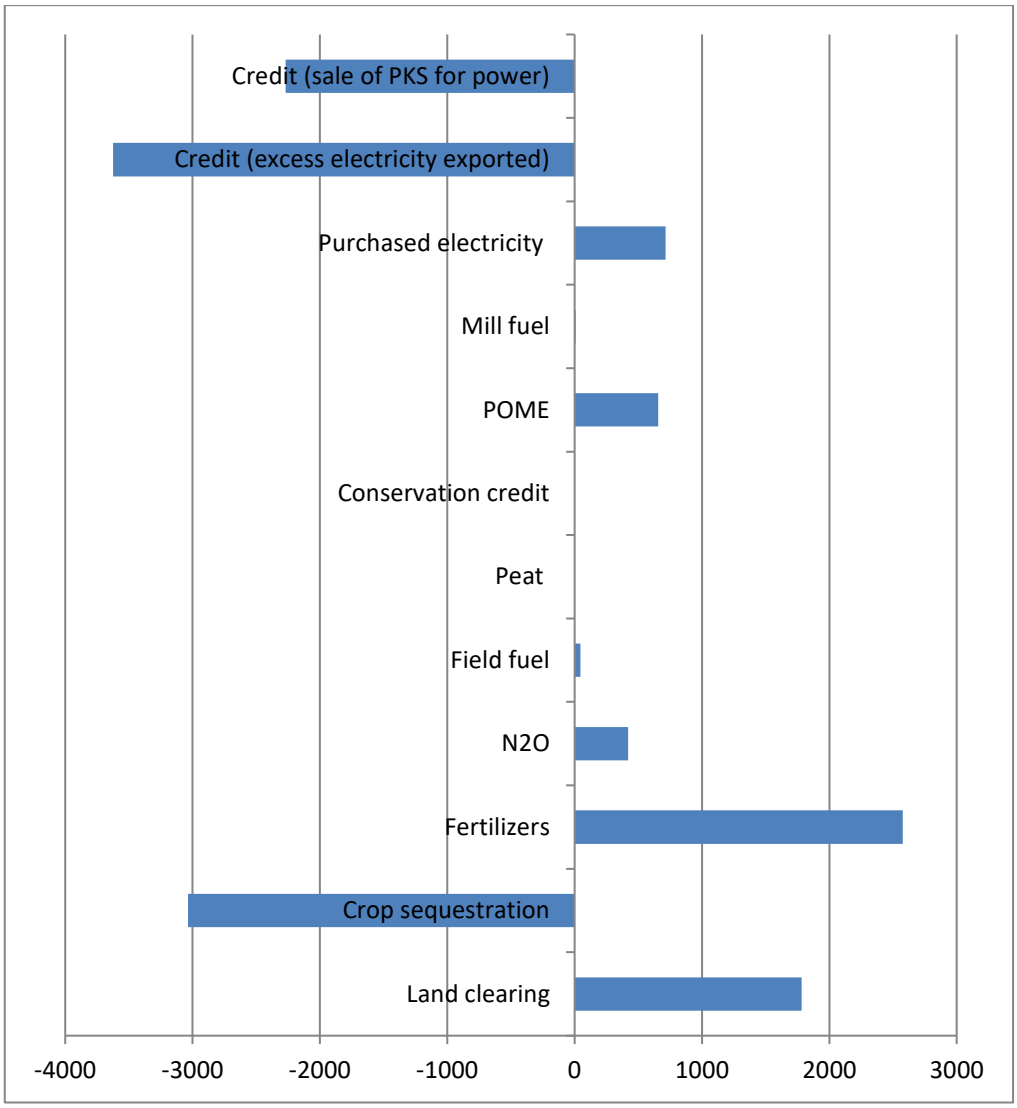


Figure 16. Summary of GHG emission from implementation of scenario 3 for PPA Kemasul

4.4. LUCA (land use change analysis)

According to the history of land use in the estates which the study areas (PPAs) are located, namely Kuala Gris Estate and Kemasul Estate, all of the study area has been managed as rubber plantation before the mid 1900's except the small patches of thicket located at several part of the eastern border of the Kuala Gris Estate. Moreover, according to the LUCA report, there is no land cover change prior to HCV assessment in both study area (table 25). Therefore, there is no compensation liability on clearance of primary forest and/or areas with HCV.

In compliance to the new planting procedure, additional analysis involving recent satellite imagery, i.e. satellite imagery of 27 September 2018 for the Kuala Gris and 25 December 2018 for the Kemasul shows that there is no change of land cover. It is confirmed that the management unit has not conducted any land clearing prior to the submission of the NPP.

Table 25. Historical Land Use Change in the PPA Kuala Gris and PPA Kemasul

Land cover	1 November 2005	1 December 2007	1 January 2010	9 May 2014	2 November 2016	28 December 2018 (NPP submission)
PPA Kuala Gris Estate						
Thickets	0	0	0	4.9	4.9	4.9
Bushes & Shrubs	4.9	4.9	4.9	0	0	0
Rubber	1,352.2	1,352.2	1,352.2	1,352.2	1,352.2	1,352.2
Total Area	1357.1					
PPA Kemasul Estate						
Rubber	342.4	342.4	342.4	342.4	342.4	342.4
Total Area	342.4					

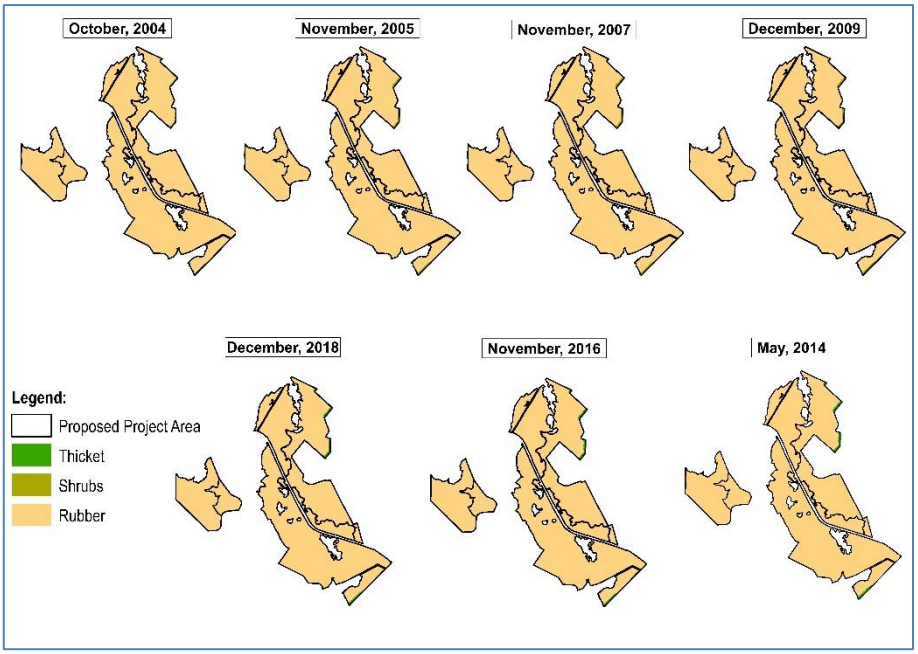


Figure 17. Land cover in the PPA Kuala Gris in each of the LUCA cut-offs

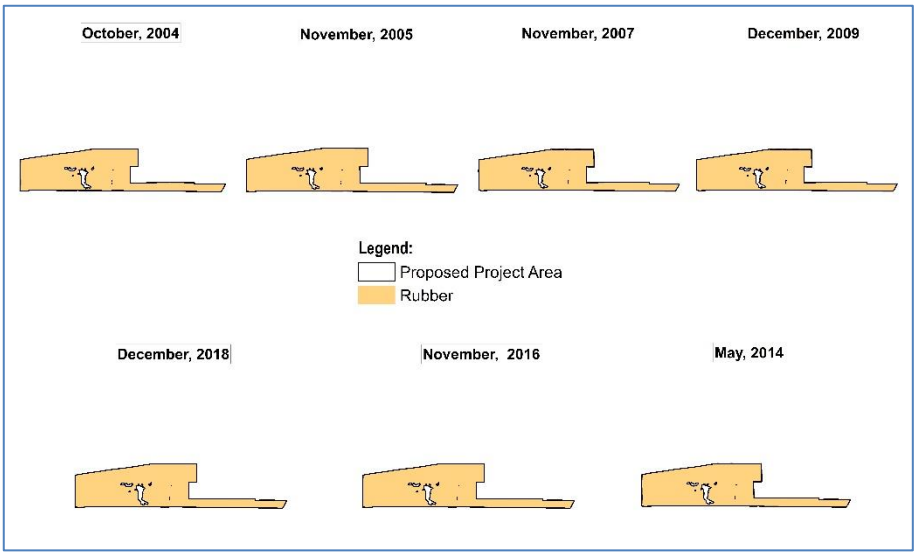


Figure 18. Land cover in the PPA Kemasul in each of the LUCA cut-offs

In the context of areas where plantings are prohibited by the RSPO, there are no areas in need of remediation since no oil palm has been planted in the study area. According to the assessments, there are only four rivers which are found as the important element in this context. The four rivers are crossing the PPA of Kuala Gris Estate, namely Teku River, Koh River, Slow Pok Long River, and Perigi River. Riparian

of the four rivers are still covered with the rubber trees. Moreover, all of the riparian in the PPA of Kuala Gris Estate have been identified as HCVMA.

4.5. FPIC study

All of the study area has been managed as rubber plantation by a British Company before the mid 1900's. The study areas, as part of a set of agricultural concessions in Malaysia under the management of the British Company then were taken over by the KLK Group in 1960's. Estates where the study areas are located are authorized by the Government to the KLK Group. It concludes that there is no ownership under the communities as group and/or as personal. Therefore, FPIC studies are not relevant for the study areas in the context of land acquisition.

Table 26. Details of the land title of Kuala Gris and Kemasul Estates

Estate	Land Title No	Land Title (Ha)	Land Title Issued Date	Previous ownership
Kuala Gris	Geran 534	1.846	23 December 1998	Kuala Geris settlement
	Geran 2188	624. 04	3 October 1991	Kuala Geris settlement
Kemasul	Geran 6820	461.007	19 August 1998	Pahang State

Source: Social Liability Assessment Report (Aksenta, 2016)

4.6. Soil and topographic assessments

There is no fragile soil or extreme topographic feature that needs to be given special attentions. All soils found in Kuala Gris and Kemasul Estates are mineral soils. The topography of the two estates is ranging from flat to undulating (figure 19 and figure 20).

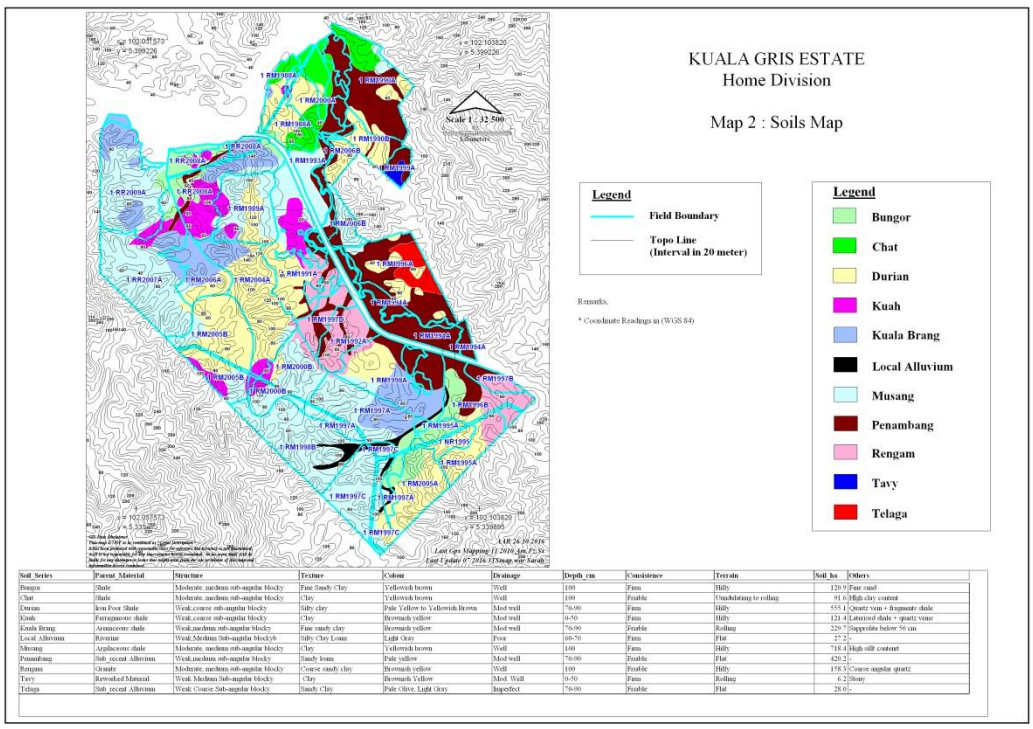


Figure 19. Map of soil and topography in the Kuala Gris Estate

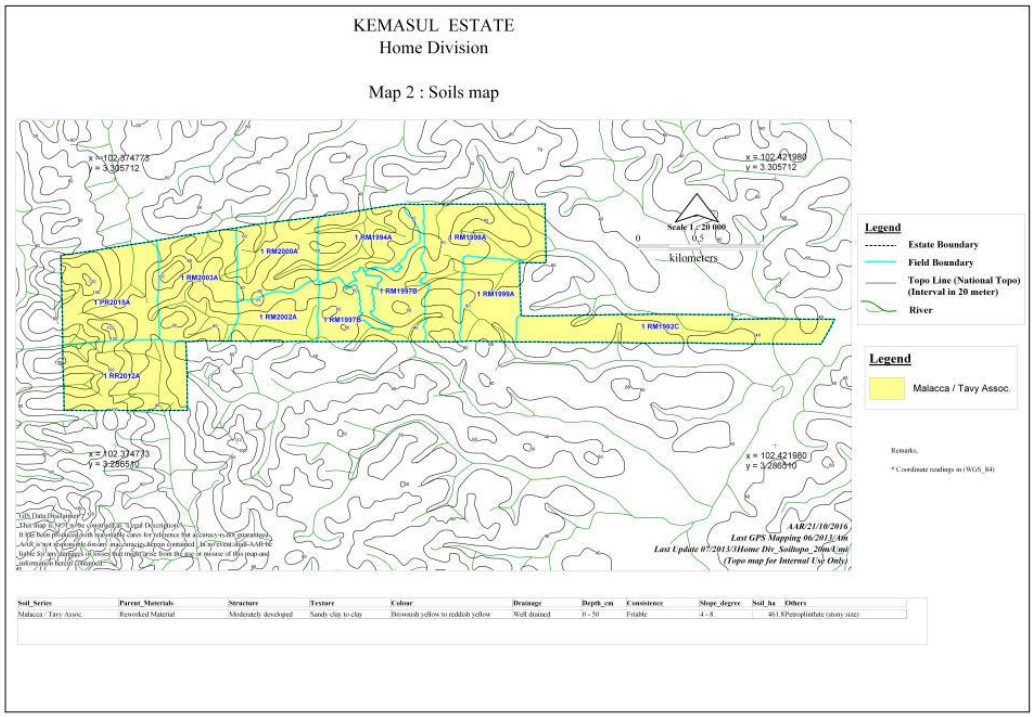
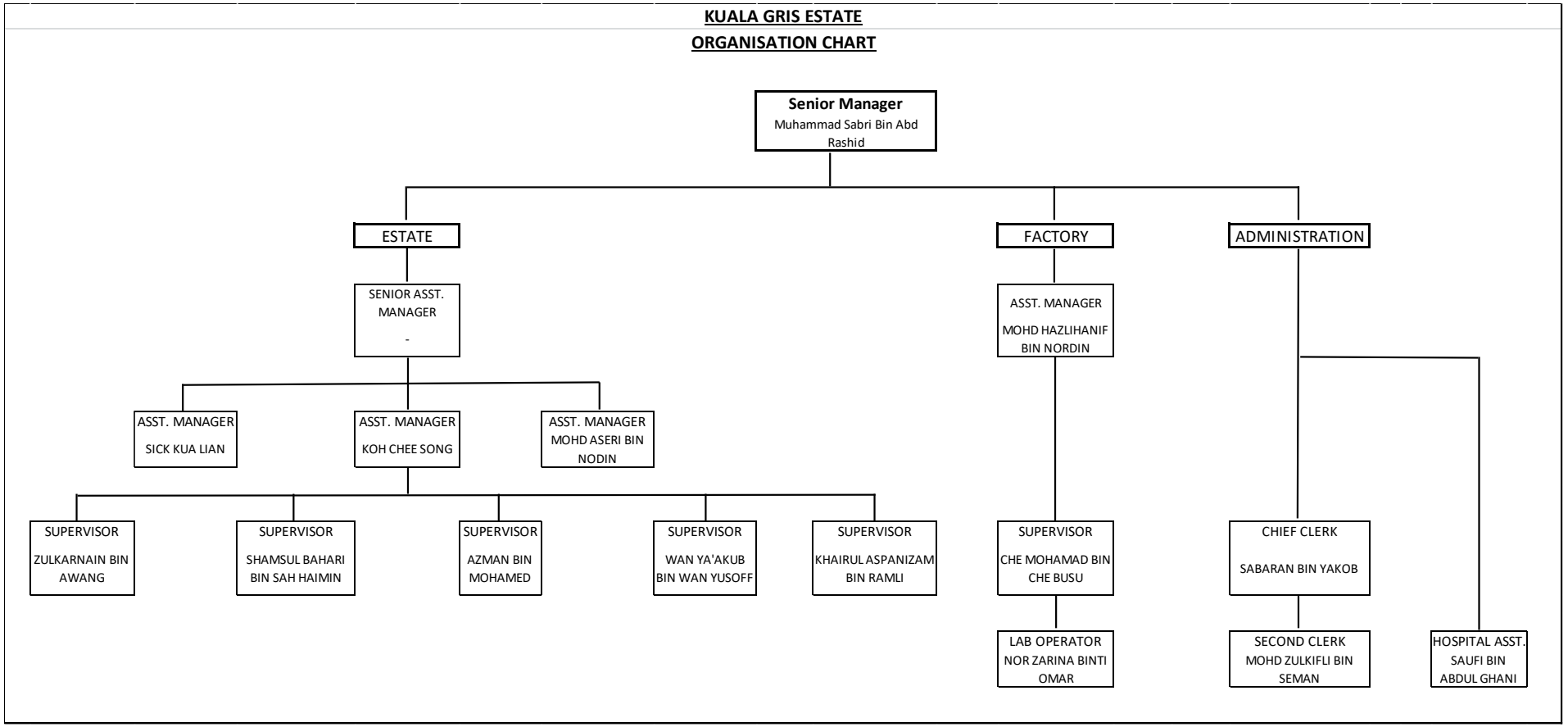


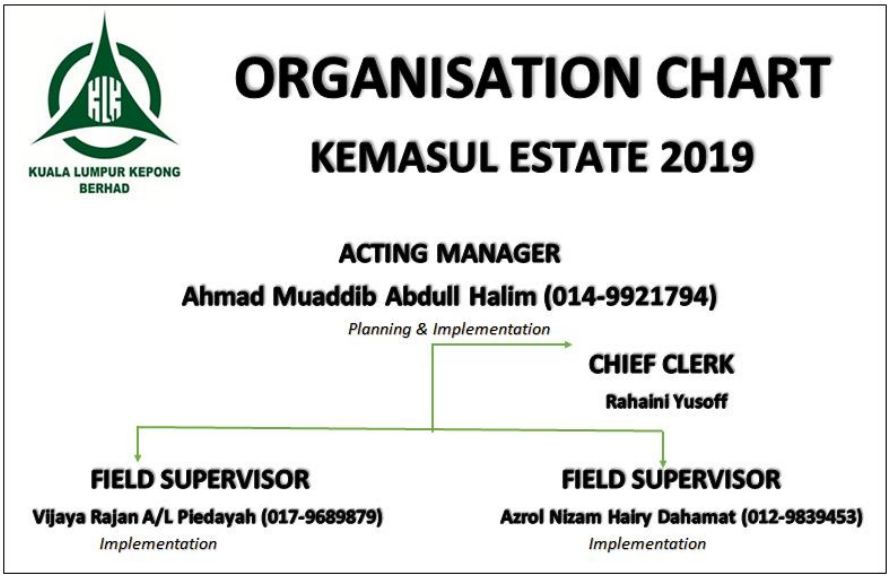
Figure 20. Map of soil and topography in the Kemasul Estate

3 Summary of Management Plan

1.1. Team responsible for developing management plans

The following are personnel who are responsible for developing management plan in Kuala Gris and Kemasul Estates. Manager from both estates will be the focal person to oversee and implement the management and monitoring plan.





1.2. Management plan to mitigate impacts to the social and environment

Social aspect

There are three villages that have moderate to high interaction with Kuala Gris and Kemasul Estates, namely Kuala Gris, Slow Pak Long, and Menteri. However, the conversion of the estates from rubber to oil palm plantation will have no significant impacts, negative as well as positive, on the people of those three villages. The most significant impact will be on the tappers as they might lose the job or should acquire a new skill compatible with the need of oil palm plantation.

Although the impact is very limited, the company still needs to develop the social management and mitigation plan. The objectives of the plan are to mitigate negative social impacts, to enhance positive social impacts, and to mitigate company's social risks. Several steps that need to be taken by the KLK, where applicable are:

1. To map the existing employees, to complete tappers' data, to determine profile of tappers, and to establish the criteria which tappers whom will be kept and whom will be laid-off.
2. To develop centralized and integrated data base of tappers from all estates to ease the transfer processes from one estate to another.
3. To develop and to establish standardized and documented policies regarding management of impacted tappers that apply to all estates.
4. To deliberate and design the scheme of lay-off benefits for the impacted tappers, so that those tappers receive their rights in accordance with the prevailing labor laws.
5. To promote public information and implementation of FPIC principles to the impacted employees, including communicating various options with their consequences in order for the impacted employees to have accurate information and enough time to make decision and plan for their future.
6. To enhance and improve CSR programs in order for the programs to be more effective by taking into account community's needs analysis.

Environmental aspect

Impacts to the environment are divided into two groups, namely impact to the physical properties and impact to the biological properties. Component of the development and the management plans in the new plantation which is causing the most impact to the environment is the conversion of crop from rubber to oil palm. Impacts to the physical properties of the environment consist of surface run-off, which respectively will increase 4 times higher compare to the existing conditions in PPA Kemasul, while in the PPA Kuala Gris is 2 times higher. Moreover, impact to the biological properties is caused from the conversion of land cover vegetation from rubber to oil palm. It will potentially cause a local migration of

the wildlife as the vegetation land cover (habitat and shelter) are changing. However, the impact is temporarily and reversible. Habitat and shelter will be recovered as the new oil palm land canopy will cover grow and provide cover to the area.

In order to mitigate the environmental impacts, particular mitigation measures are required, namely:

1. Soil and water conservation through a land application practices (i.e. sediment trap).
2. Planting land cover crop (standard of replanting in particular policies).
3. Applying land terraces (standard of replanting in particular policies).
4. Setting direction for trees cutting.
5. Prevent poaching of the wildlife.

1.3. Management plan of the HCV (relevant only for the PPA of Kuala Gris Estate)

Management and monitoring recommendations that must be taken into consideration in developing a comprehensive HCV Management and Monitoring Plan, are describe in **Table 22**. These recommendations are not specific as they refer only to the primary threats to each HCV type.

Table 22. Management and Monitoring Recommendations

HCV Type	Threats	Management Recommendations	Monitoring Recommendations
1	• Decline in RTE species diversity due to poaching	• Ensure that all staff, workers and surrounding communities, including migrant community do not poach RTE species. • Raise community awareness on RTE species.	• Monitor poaching of RTE species. • Carry out routine monitoring over the presence of RTE species in the riparian buffers
	• Degradation of vegetated riparian buffer area which functions as aquatic wildlife habitat	• Protect HCVAs, in collaboration with local communities • Carry out replanting and rehabilitation in HCVAs.	• Monitor HCVA size and quality of the riparian buffers. • Community interviews to monitor trends in hunting. • Periodic patrols along river banks to preserve river areas including effectiveness evaluation. • Document information dissemination to relevant stakeholders.
2	• Potential degraded secondary forest area	• Inform to all staff, workers and surrounding communities, including migrant community there is potential HCV 2 in bounder Kuala Gris Estate • Monitor land clearing, especially those taking place close to HCVAs (HCV management areas). • Develop SOP to mitigate conflicts between wildlife and humans, especially for tiger.	• Monitoring quality of secondary forest outside Kuala Gris Estate with visual observation method. • Monitoring HCVAs with collaboration with relevant stakeholder • Monitoring of presence of tiger (footprints) in HCVMA

HCV Type	Threats	Management Recommendations	Monitoring Recommendations
4	• Potential land conversion along riverbanks • Decline in water quality due to intense surface runoff • Potential excessive use of agrochemicals	• Construct silt pit (2 x 1 x 1 m) in planting areas or roadsides, to increase retention and infiltration and protect against erosion. • Construct gully plugs or sediment traps for tributaries (width <4 m). • Rehabilitate degraded riverbanks. • Practice manual weeding and limit fertilizer and pesticide application (at least 20 m from riverbank, depending on the buffer zone width).	• Monitor water quality (every 6 months) in inlets and outlets of rivers that flow through the assessment area • Effectively monitor of vegetative erosion prevention efforts to manage riverbank erosion • Measure sedimentation level in water quality monitoring locations. • Document number of locations of landslide or high erosion. • Monitor the physical condition of technical civil structures
	• Reduced vegetated area and/or quality in catchment areas • Conversion of Rubber Plantations by Land Clearing	• Monitor land clearing, especially those taking place close to HCVAs. • Enrich degraded parts of catchment areas. • Collaborate with local communities, government and neighboring companies to protect rivers and riverbanks	• Monitor size and quality of vegetation cover in riparian buffers • Supervise land clearing contractors. • Record and document land clearing. • Monitor vegetation growth (%)

Note: All HCV outside assessment area, included potential of HCV 2 area (outside grand of Kuala Gris Estate) is not entirely the responsibility of KLK, it needs to involve other stakeholders such as Government, NGO and Local Communities.

HCVMA designation, awareness raising and capacity building

1. As part of precautionary approach, KLK management decided not to clear the thicket areas and maintain as it is if the thicket area is within our estate boundary. The delineation and demarcation of HCV areas uses maps (figure 21), and delineation of HCV areas should be carried out together with all relevant stakeholders. Before delineation, the company should be presented HCV result with local stakeholders, especially around Kuala Gris Estate.

2. Designate HCVA, this activity comprises HCVA map delineation, verification of the delineated areas with local stakeholder, and determining the final results as HCVA map. Company must document this process in an HCVA delineation report. This is followed up by setting up HCVMA boundary markers and signboards.

3. Appropriately and effectively disseminate information to:
   a. the companies' internal (field workers and staff);
   b. the surrounding communities (land users and local community); and
   c. relevant institutions (consultation)

4. Develop HCV Management Plan and Monitoring Plan, with the following considerations:
   a. Species protection, which includes reducing poaching and protecting wildlife corridors between HCVAs as well as in forested areas around the assessment area. Riparian reserve act as wildlife corridor which enable animal and plant to move through the landscape.
   b. Connectivity of HCVA to the local landscape (boundary of wider landscape)

c. Strengthening communication with neighboring companies to develop joint HCV management and protection action plans.
d. Local community engagement, because the HCVAs are beneficial to all stakeholders.
e. Implement the existing company procedures and policies.
f. Protect the integrity of wildlife habitats, by gazette the HCV areas, and regular patrolling
g. Needed further identifying plant species
h. Launch awareness programs regarding the RTE species which need to be protected (both local communities, as well as company's employees)
i. Prevent poaching and hunting of RTE species in the HCV areas by all staff and employees of KLK Bhd and by local communities
j. Planting of natural vegetation along the rivers of which the buffers are degraded
k. Reinforcement of river banks which are prone to erosion
l. Construct sediment traps/ gully plugs in the tributaries, smaller streams and ditches, to prevent sedimentation in the HCV areas
m. Apply civil-technical structures to conserve the soil and water, such as terraces, silt pits, roadside pits, and retaining dams

5. Disseminate information on presence, shape and significance of HCVAs, including company commitment to protect them. This is especially aimed at land clearing contractors, company staff and workers, local communities, and local governments

6. Develop organization to manage HCVAs.
   a. Designate management unit to ensure effectiveness and accomplishment of HCV management.
   b. Train staff and, if needed, recruit qualified staff to manage HCVAs.
   c. Develop HCV management SOP and policies.

7. Develop HCV management, monitoring and evaluation capacity:
   a. HCV monitoring training: basic wildlife and vegetation species identification, water quality measurement, stakeholder engagement and other topics relevant to HCV sustainability.
   b. Consistently implement policies and SOPs.

8. Create and communicate stakeholder list, and collaborate with all relevant stakeholders on HCVA management, especially for HCVA 4.

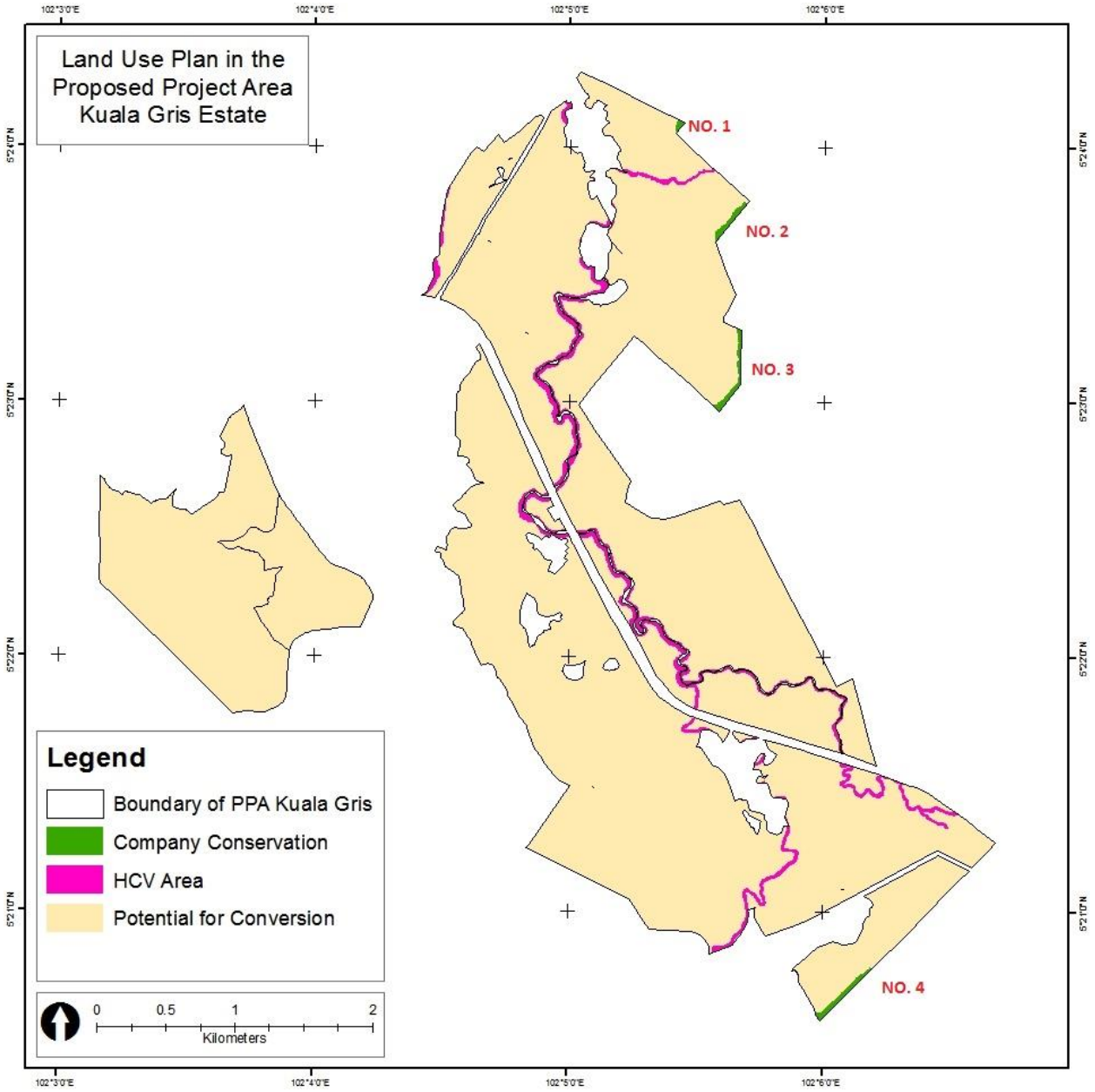


Figure 21. Map showing the indicative HCV 1 and HCV 4 areas and the HCVMA in the PPA of Kuala Gris Estate

1.4. Management plan for the mitigation of GHG emission

The scenario of development and management plans for the PPA of Kuala Gris Estate and the PPA of Kemasul Estate are selected based on the capability and availability of each management unit. Scenario 2 and scenario 3 from the recommendations of the GHG Assessment are selected respectively by the management unit of the Kuala Gris Estate and Kemasul Estate.

PPA Kuala Gris

Key activity to implement the GHG emission mitigation plan for PPA Kuala Gris is to safeguard the conservation area and to maintain the growth of the oil palm crop. In order to achieve the GHG emission mitigation for PPA Kuala Gris, following are activities to be included in the management and monitoring plan:

1. To carry out delineation and demarcation of the conservation areas.
2. To socialize the management and protection of the conservation areas, especially during the land clearing in the crop conversion program.

3. To ensure implementation of the HCV management and monitoring.
4. To ensure the monitoring of GHG emission mitigation by periodically controlling the use of components of GHG emission source (e.g. fertilizers and fuel).
5. To ensure appropriate plantation operations to biomass growth of the new oil palm crop in the PPA as one of the significant sources of carbon sequestration.
6. To continuously monitor the GHG emission from the production of FFB and palm oil by following the requirement under the RSPO P&C, i.e. GHG emission calculation using the up to date RSPO Palm GHG Calculator.
7. To put efforts in implementing general measures to improve optimal ratio of GHG emission per production, i.e. yield improvement, substitution of components with lower GHG emission, designing optimal transport route in the field and/or to the mill, etc.

PPA Kemasul

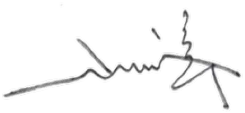
Key activities to achieve the GHG emission mitigation for the PPA Kemasul are focused to the in-mill operation accordingly to the recommendations from the GHG assessment. They are to ensure the advanced utilization of the mill-by products as substitution of other fuel with higher GHG emission. List of activities to be included in the management and monitoring of the GHG emission mitigation for PPA Kemasul are as follow:

1. To ensure that the FFB from the new oil palm crop in PPA Kemasul will be transported to mill which is available to implement the selected GHG emission mitigation measures for PPA Kemasul.
2. To periodically monitor the actual yield from the new oil palm crop in the PPA including the mill-by product to be exported to other utilization (i.e. PK for sale, volume (%) of POME to be diverted to methane capture, and export of excess electricity).
3. To ensure the monitoring of GHG emission mitigation by periodically controlling the use of components of GHG emission source (e.g. fertilizers and fuel).
4. To ensure appropriate plantation operations to biomass growth of the new oil palm crop in the PPA as one of the significant source of carbon sequestration.
5. To continuously monitor the GHG emission from the production of FFB and palm oil by following the requirement under the RSPO P&C, i.e. GHG emission calculation using the up to date RSPO Palm GHG Calculator.
6. To put efforts in implementing general measures to improve optimal ratio of GHG emission per production, i.e. yield improvement, substitution of components with lower GHG emission, designing optimal transport route in the field and/or to the mill, etc.

4 Internal Responsibility

Formal Sign-off by Assessors and Company

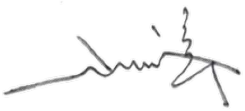
This document is the Summary of Assessments for the New Planting Procedures for the PPA of Kuala Gris Estate and Kemasul Estate under the Management of KLK Berhad.

Team Leader of Assessments	**Management of KLK**
	
Nandang Mulyana (Team Leader) Date: 14/2/2019	Sin Chuan Eng (Head of Sustainability) Date: 14/2/2019

Statement of Acceptance of Responsibility for Assessments

Results of the Assessments in the New Planting Procedures for the PPA of Kuala Gris Estate and Kemasul Estate by Aksenta will be applied as part of the guidelines in developing and managing the management units of KLK Berhad.

Management of KLK



Sin Chuan Eng
(Head of Sustainability)
Date: 14/2/2019

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