

## Chapter

# 6

# Recommended Monitoring Programme

## 6.1 Introduction

This Chapter outlines approach, schedules and party responsible for monitoring (compliance and impacts) on the key environmental issues as discussed in the previous **Chapter 4** and **Chapter 5**.

## 6.2 Compliance Monitoring Programme

### 6.2.1 Internal Monitoring Team

To effectively implement the monitoring requirement, it is recommended that the Project Proponent set up an internal environmental committee within the organisation to oversee the whole development. This committee should be independent of the operation and serves as “supervisory body” for the management.

The committee should comprise at least the following personnel and their general roles or task shall be as mentioned below:

No.	Personnel	General Task
1.	Project Director	Allocate financial resources as and when required.
2.	Environmental Manager	Oversee the overall management and operation of the environmental requirements. Supervise and enforce environmental requirement. Coordinate staff and resources in the delivery of remediation measures. Advise the Management on the environmental issues. Liaise with the relevant Government agencies and stakeholders.
3.	Environmental Officers (one for each plantation area)	Brief the contractors of all the legislative requirements. Monitor the implementation of all the mitigating measures in all the development area. Carry our monthly environmental audit for all the plantation area. Inform the Manager of the potential issues or non-compliance.

It is recommended that the Project Proponent carry out the following during the land clearing and preparation:

- Monthly ground monitoring/surveillance in the land clearing and plantation development for riparian reserves, road conditions, steep area, base camp and sensitive areas.
- Remote sensing imageries are to be sourced for an overview monitoring of the Project site. The cost of all these monitoring could be borne by the management of the plantation JV.
- Inform the contractors to comply with all the environmental requirements and provide them with maps on all the protected sites.

An internal monthly report should be prepared on the environmental requirements for all the plantation areas. The details of the compliance monitoring requirements will be further discussed in **Section 6.3**.

## **6.2.2 External Monitoring Team**

### **6.2.2.1 Government Agencies**

All the relevant government agencies such as the Environmental Protection Department (EPD), Sabah Forest Department (SFD), Sabah Wildlife Department (SWD), Drainage and Irrigation Department (DID)(water resources) and Health Department would carry out regular or random check in all the plantation areas at their discretions.

### **6.2.2.2 Independent Consultants**

Apart from carrying out internal monitoring, the Project Proponent should also engage independent environmental consultants (*e.g.* environmental scientist, forester, wildlife ecologist, flora ecologists and others) to carry out environmental auditing and monitoring on a quarterly basis. A quarterly report should be compiled and submitted to the Environmental Protection Department (EPD), Sabah. In addition, the Consultant should advise the Client as and when required during their contract period to ensure environmental compliance and protection. It is also the duty of the Consultant to check the effectiveness of the suggested mitigating measures and recommend, as and when appropriate, additional mitigating measures to ensure the project is implemented in a sustainable manner. The details of the monitoring requirement are presented in **Section 6.3**.

## 6.3 Compliance Monitoring Requirements

The following are the compliance monitoring requirements for the proposed Project.

### 6.3.1 Riparian Reserve

Riparian buffer belts should be clearly marked with paint on the trees at 1.5m height to provide the indication of protected area. Provide maps for the contractors involved and impose fine on the contractors for any infringement of the protected site and a stop work order applied pending further investigation.

#### 6.3.1.1 Sg. Kalabakan and Its Tributaries

- a) GPS Location and photo with date showing the demarcation of riparian reserve of at least 1000 m both side of the river banks for Sg. Kalabakan and Sg. Anjeranjermut as it flows parallel to the Kalabakan-Sapulut Road. The marking of the riparian reserve should be clearly marked with paint on the trees at 1.5-m height to provide the indication of the reserves. See **Figure 6.3.1 and Plate 6-1**.

#### 6.3.1.2 Sg. Brantian and its Tributaries

- a) GPS location and photo with date showing the riparian reserve of at least 250 m both side of Sg. Brantian. Marking of the riparian reserve should be clearly marked with paint on the trees at 1.5-m height to provide the indication of the reserves (see **Figure 6.3.2 and Plate 6-2**).
- b) GPS Location and photo with date showing the riparian reserve for Sg. Geminchau, a tributary of Sg. Brantian should be provided in the compliance monitoring report.

#### 6.3.1.3 Sg. Kuamut and its Tributaries

It must be highlighted again that the proposed Project area falls outside the 5-km Sg. Kuamut river buffer. However, actions must be taken to ensure the following is retained:

- a) Kuamut river east of Maliau Basin – 5km from river towards the east, referred as the Kuamut river buffer zone.
- b) Kuamut river north of Benta Wawasan I – 1km from river towards the south, referred as the Kuamut river buffer zone.

The marking of this buffer zone should be clearly marked with paint on the trees at 1.5-m height to provide the indication of the reserves. Photo (with date) and GPS locations of these markings must be produced in the compliance report.

Regular monitoring of this buffer zone from any form of encroachment is important, e.g. logging and hunting. See **Figure 6.3.3 and Plate 6-3**.

#### 6.3.1.4 Other streams

- a) Riparian Reserve for other streams within the Project area should retain at least 30m on both sides of the banks and 5 m for smaller streams. Photo (with date) and GPS location of the smaller stream should be included in the compliance monitoring report.

### 6.3.2 High Risk Area and Sensitive Area

#### 6.3.2.1 High Risk area

- a) **Localised or Micro High Risk Area/ Ridge Top & Natural Link.** Boundary of these sensitive areas should be clearly marked on ground. See **Figure 5.2.1, Figure 5.2.2, Figures 6.3.4 and 6.3.5** and **Plates 6-4 to 6-6**. Provide also photo (with date) and GPS location showing immediate (fast regrowth) replanting of cover crop in a localized steep/ high-risk area to prevent any slope failure or erosion.

#### 6.3.2.2 Ecological Sensitive Areas

- a) **Mud volcano** – The riparian and road reserve of 1km on both side of the river/road must encompass the mud volcano and salt licks found in BW9/99 and at SUAS project. The boundary (see **Figure 5.2.2**) should be marked on the ground or on the trees at 1.5-m height. Photo of the survey work (with date) and GPS locations of the survey transects should be shown.
- b) **Orangutan** – Orangutan is the only species of significance found in the proposed Project site. Nests were spotted in BW5/98 and Brantian-Tatulit VJR. The clearing of BW5/98 must be monitored closely. This must include photos with date and GPS locations showing spotting of this species or its nest (**see Plate 6-7**).
- c) **Minibelt wildlife corridor** - The forest link between the Luasong Forest Area, INNIKEA and SUAS to the wildlife corridor and Maliau Basin must be maintained and managed as natural forest (see **Figure 6.3.6**) – Photo and GPS locations of the marking on the trees at 1.5-m height along the linkage area and aerial photo of the linkage on a yearly basis.

### 6.3.3 Flora and Fauna Ecology

- a) **Virgin Forest Reserves (VJR)** – Aerial photo with date of the two VJRs (see **Figure 2.2.1**) within and near to the Proposed OPP and ITP Project area at least once a year. A 100-m buffer belt around the VJRs has to be marked on the ground or on the trees at 1.5 m height. See **Figure 6.3.7** and **Plate 6-8**. Photo (with date) and GPS location showing the demarcation of the VJR from OPP and ITP development should be provided in the compliance monitoring report.
- b) **Security Gate** - Photo (with date) and GPS location of the security gates at all the entrance (refer to **Plates 6-9**). Regular check should be conducted on the record book of all the incoming and outgoing vehicles into the Project area.
- c) It is recommended that Wildlife Department make **regular checks** (at least once a month) **on base camps** and sites for any poaching.

- d) **In-situ conservation of BW1/00 in Benta I** - Photo (with date) and GPS locations showing the marking or painting on the trees in Coupe BW1/00 i.e. area above 16 degree slope area (see **Figure 6.3.8**).
- e) For **ex-situ conservation**, selected genetic materials and species a systematic collection programme will have to be developed together with local institutions of higher learning and the Sabah Forestry Department. A suitable site within the Project area could be established for planting of these collected materials. This conservation programme will have to be in synchrony with the clearing works so that suitable materials are collected before land clearing starts. Proper permanent documentation must be kept and all plantings must have labels to indicate their origin.
- f) Aerial surveillance/ monitoring once every six months to ensure that natural forest reserved for conservation is not illegally logged. At a macro level remote sensing imageries could be an efficient tool to detect any changes in the forest cover.
- g) Aerial and ground monitoring on the land clearing and planting works are going more or less hand-in-hand i.e. land clearing = planting of oil palm. The monitoring points are presented in **Figure 5.2.1** and **Figure 5.2.2**. However, not all the points need to be covered in one monitoring period as the areas are developed in phases and hence there are some areas that may not be accessible.
- h) Satellite imagery procurement with date once prior to Project commencement and thereafter once every year (see **Plate 6-10**).

### 6.3.4 Hydrological Impact

- a) The Project area must be developed in phases. The Project phases must be drawn on a map with preferred scale of 1:10,000. Proper markings must be done on ground, accompanied with photos (with date) and GPS readings.
- b) All floods that occur within and nearby the Project site must be properly recorded, accompanied with photos (with date). Actions taken to address this impact must be properly documented as well.

### 6.3.5 Infrastructure Development

#### 6.3.5.1 Access Road

- a) The road alignment should be drawn on a map with contour lines, preferably scale 1:10,000. Their locations (GPS references), width of the road and skid trail be specified and photo showing the conditions of the road, skid trails and landings. The contractors should be given a map showing the old logging road and other existing infrastructure.
- b) Photo (with date) and GPS locations of all the road surfaces and drainage system including any failures.
- c) Photo (with date) and GPS locations of filter strips along roads with clear marking either paint on trees or flag along the boundary of the demarcated area.
- d) Photo (with date) and GPS locations of silt traps at the discharge outlet within the planting areas.

### 6.3.5.2 Base camp and Workshop

- a) Photo (with date) and GPS locations of all the base camps and workshops (See **Plates 6-11 and 6-12**). All base camps or workshops that are within 40 m from the nearest waterways should be relocated further away.

## 6.3.6 Socio-Economics

### 6.3.6.1 Water Supply Sources

- a) All the contractors should keep a record of all the particulars of their workers.
- b) The external consultant should carry out water monitoring especially the microbiological tests (Total coliforms count & Faecal Coliform Count) at the water intake points for all the base camps, Luasong Forestry Centre, Kg Fajar Harapan Luasong, Kpg. Brantian and Kalabakan town. The GPS locations, maps and photo (with date) must be included (see **Plates 6-13 to 6-15**).

### 6.3.6.2 Waste Management

- a) **Domestic waste** – Photo (with date) and GPS location of all the waste disposal site including the locations of dump pit and sanitary facilities.
- b) **Oil and Grease** – All used oil and grease should be contained and disposed off in an appropriate manner. GPS locations and photos should be provided in case of non-compliance.
- c) **Oil Storage area** – Photo (with date) and GPS locations showing that oil storage area is properly bunded and sited on stable ground. See **Plate 6-16**. The storage facilities should be at least 50 m from the nearest waterways.

### 6.3.6.3 Worker's Safety

- a) **Safety Gear** – Photo (with date) on worker's attire; name of contractor and logging coupes should be provided in the compliance monitoring report.
- b) **Worker's Health** - A record of medical fitness showing the status of worker's health who works in the plantation project.
- c) **Base camp** – GPS location and photo (with date) showing that the base camp quarter is equipped with potable drinking water and the sleep quarter is installed with mosquito netting.

### 6.3.6.4 Ecotourism Opportunities

- a) **Mud volcano** – demarcation of the mud volcano for potential ecotourism.
- b) **Sandstone Outcrop and the gouge at Sg Anjeranjermut** – GPS locations and photo with date showing the demarcation of 100-m buffer (or riparian reserve) on the trees at 1.5-m height in Sg Anjeranjermut.
- c) **Kalabakan-Sapulut Road** – GPS locations and photo (with date) showing the marking of 1000-m green buffer on the trees at 1.5-m height on both sides of the road.

### 6.3.7 Biomass Management

- a) All vegetative waste must be stacked in rows to allow it to degrade naturally. Photo (with date) and GPS location of the stacking of biomass during land clearing must be provided in the compliance monitoring report.
- b) Monitoring should be carried out on any evidence of burning at the field during site preparation. See **Plate 6-17**. Photo (with date) and GPS location where this occurs should be properly recorded in the monitoring report.

## 6.4 Monitoring Programme for residual impacts

### 6.4.1 Water Quality Monitoring

- a) **Water Supply to the Settlements or base camp** – GPS locations and photo (with date) showing water quality monitoring at major water intake as mentioned in **Section 6.3.5.1** above. The recommended monitoring locations are presented in **Figure 5.2.1** and **Figure 5.2.2**. The parameters recommended are Total Coliform Count, Faecal Coliform Count, Biological Oxygen Demand (BOD) and Chemical Oxygen Demand. The frequency of the monitoring is on a quarterly basis, i.e. once in every (4) months. When the oil palm plantation is established (1-3 years), monitoring of agrochemicals is recommended. The parameters for the water quality analysis are the organochlorinated and organophosphorated pesticides; paraquat; Glyphosate and Amino-methylphosphonic acid. The frequency can be once in every six (6) months.
- b) **Planting Area** – GPS location and photo (with date) showing water quality monitoring at the planting areas (see **Figure 5.2.1** to **Figure 5.2.2** for the proposed locations) on a quarterly basis. The parameters recommended for this phase of development are Total Suspended Solids, turbidity and oil and grease.

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