Chapter 1 Executive Summary

1.1 General

The purpose of this Special Environmental Impact Assessment (SEIA) is to assess the impact of establishing a 109,600 ha oil palm and industrial tree plantations in Kalabakan and Gunung Rara Forest Reserves, Tawau District, Sabah.

This SEIA is prepared in accordance with the guidelines prepared by the Environmental Protection Department, Sabah. The assessment of the SEIA is covered in 6 chapters. **Chapter 1** is the executive summary. **Chapter 2** provides some general project background while **Chapter 3** presents the Project description. The impacts assessment of the Project is detailed in **Chapter 4** while **Chapter 5** presents the mitigating measures. **Chapter 6** outlines the compliance monitoring for the suggested measures. **Annexes A and B** contain both the existing environments and the methodologies used in this SEIA. **Annexes C and D** comprise the References and Terms of Reference for the SEIA.

1.2 Project Background

Due to imminent shortage of timber to support the wood processing industry, there had been plans to develop the proposed Project area into a forest plantation area. However, the economics and financial returns of *Acacia* and other crops showed that oil palm far outperform other cash crops.

Hence, following approval from the Sabah Forestry Department on 17th June 2004 marks the planning for the OPP and ITP Project. The concept of this development is in accordance to slope gradient. Oil palm would be confined to land with slopes ranging from 0-20^{o}. Industrial tree plantation is confined to slopes of 20-25^{o}. Slopes of over 25^{o} should be conserved for biodiversity and natural forest management.

1.3 General Description

1.3.1 The Project Proponent

The development of oil palm plantation will be carried out by three (3) major parties, i.e. Yayasan-Melaka JV, Ratus Awansari Sdn Bhd JV and Yayasan Sabah Group (YSG) (to be mainly managed by Sabah Softwoods Bhd). The main initiator is **Benta Wawasan Sdn Bhd**, with the address and contact person as follows:

Benta Wawasan Sdn Bhd
Level 12, Wisma Innoprise, Teluk Likas,
P. O. Box 11623
88817 Kota Kinabalu, Sabah
Tel: 088-326 507/8
Fax: 088-233 672/ 326 510

Contact Person: **Mr. Cyril Pinso**
Designation: Group Manager, Agro-Plantation Division, YSG cum Director, Benta Wawasan Sdn Bhd

1.3.2 Proposed Project Area and Location

The proposed Project study area covers about 109,600 ha of land. Basically it comprises the Tree Plantation and Forest management Agreement of Benta Wawasan Sdn. Bhd. (BWSB) – i.e. Benta I and Benta IIC area, also a wholly-owned subsidiary of ICSB[1a].

The geographical position of the proposed development is between longitude 117^{o} 11' E and 117 ^{o} 40' E and between latitude of 4^{o} 23'N to 4^{o} 52'N. In terms of straight-line distance, the furthest corners of the Project site stretch approximately 60 km from south to north and also 60 km from east to west. The proposed site encompasses the Forest Management Units (FMU) No. 22, 23, 25 and 26.

The land area earmarked for the plantation currently consists mainly of logged over lowland dipterocarp forest. Generally, Benta I is located in the Gunung Rara Reserve whereas Benta IIC is in the Kalabakan Forest Reserve, bordered by FMUs 16 and 20 to the north, Sabah Softwoods Bhd plantation to the east and south east, the township of Kalabakan to the south and Innoprise Corporation Sdn Bhd – ICSB's international collaborative projects such as the SUAS project[1b], the INIKEA rehabilitation project[1c], the RBJ/NEP Reduced Impact Logging (RIL) Project[1d] to the west of the Project area. The Luasong Forestry Centre (LFC)[1e] is located between Benta I and Benta IIC, with its northern portion bordering Benta I.

[1a] Innoprise Coorperation Sdn Bhd was incorporated in 1988 as the investment vehicle of Yayasan Sabah as well as the management and holding company of the YS's group of companies.
[1b] A forestry project on timber harvesting between ICSB and Swedish University of Agricultural Sciences.
[1c] A forestry project on rehabilitation of degraded forest between ICSB and the Sow-A-Seed Foundation established by the IKEA group of Sweden.
[1d] A forestry project on the use of "Reduced Impact Logging (RIL)" between RBJ and New England Power Company (NEP) of USA.
[1e] Luasong Forestry Centre is a centre for tropical forest management and development of RBJ.

1.3.3 Statement of Need

With the drastic dwindling of forest resources within the Yayasan Sabah Concession Area (YSCA), the generation of income for the Yayasan Sabah to continue its socio-economic activities will be greatly affected. In order to complement and supplement the loss in timber revenue, new sources of revenue have to be sought in order to generate sufficient funds for the Yayasan Sabah Group (YSG) to continue its social economics programme.

The proposed development, particularly the Oil Palm (OP) plantation development is undertaken in lieu of *Acacia Mangium* as a financial approach to generate sufficient income to primarily rehabilitate the secondary forests in the Yayasan Sabah Concession Area, and secondarily as a stop gap measure to generate sufficient funds for the YSG and also the Sabah Government. Environmentally, oil palm has comparative advantage over other crop options for the following reasons:

- A perennial tree crop like oil palm provides permanent crop cover to reduce soil erosion especially where terracing and cover crops are used.
- It is not affected by serious pests or diseases, thus minimising the use of pesticides.
- Existing and future technology utilises many plant parts and products to reduce waste generation.
- The crop cycle of 25 years makes it an effective crop in 'greening' of the environment.

The proposed development will also bring about economic spin-offs to the Tawau region and the State of Sabah. According to the Project Proponent, the plan to develop approximately 80,000 ha of the proposed Project area with oil palm is expected to generate about RM15 billion in revenue for one cycle of cultivation.

1.3.4 Project Description

The main development in this Project is Oil Palm Plantation (OPP) development. It will be carried out by the three (3) major parties, i.e. Yayasan-Melaka JV, Ratus Awansari Sdn Bhd JV and YSG (with Sabah Softwoods Berhad[1f] as the management consultant). The total land area involved is approximately 80,000 hectares.

The Project Development Schedule for the OPP will be initiated from Year 2005 to Year 2010. See **Table 1.3.1**. This area will be rehabilitated back to forest after the 30-year cycle[1g].

As for the proposed Industrial Tree Plantation (ITP) Development, it will be carried out at a much later stage and will mainly involve planting of high-value tree species such as Jelutong, Sentang, Mahogany, etc. The tree planting schedule is not ready yet at the time of preparing this SEIA.

[1f] Sabah Softwood Bhd (SSB), a subsidiary of Innoprise Corporation Sdn Bhd (ICSB) is the only large-scale commercial forest plantation company in Malaysia. SSB has currently developed 82% of its 60,000 ha of its area. Fast-growing forest tree species was planted in an area of 36,000 ha, including 18,000 ha of *Acacia*, 10,000 ha of *Albizzia*, 6,000 ha of *Gmelina*, and 2,000 ha of pine and eucalyptus. Agricultural crops cover 14,900 ha of oil palm and 100 ha of cocoa. During its 26 years of operation, SSB has planted cumulatively 68,034.5 ha of agriculture and forest plantations.

[1g] This is in accordance to the approval issued by the Sabah Forestry Department on 17th June 2004 for the conversion of the area for oil palm plantation development, for a period not exceeding thirty (30) years and with conditions.

Table 1.3.1: Project Development Schedule

DEVELOPER	YEAR 2005 HA	YEAR 2006 HA	YEAR 2007 HA	YEAR 2008 HA	YEAR 2009 HA	YEAR 2010 HA	TOTAL HA
RASB*	0	2,500	4,000	4,500	4,500	5,500	21,000
Yayasan Melaka*	500	1,000	1,200	1,200	1,100	0	5,000
BW Plantations 1	1,000	2,500	5,000	7,500	7,500	1,500	25,000
BW Plantations 2	1,000	2,500	5,000	7,500	7,500	1,500	25,000
BW Plantations 3	0	500	1,100	1,100	1,300	0	4,000
TOTAL HA	**2,500**	**9,000**	**16,300**	**21,800**	**21,900**	**8,500**	**80,000**

** Joint-Venture Companies*

The key activities anticipated for the proposed **OPP development** are:

- Land preparation (i.e. underbrushing, felling, pruning, stacking and windrowing);
- Infrastructural development (i.e. roads – access road, main road, harvesting road and collection/in field road; drains, bridges and culverts);
- Oil palm nursery development (i.e. siting and large-polybag nursery);
- Field establishment (i.e. lining, terracing, cover crop establishment, holing and field planting);
- Maintenance (i.e. pruning, weed control, pest and diseases control, fertilizer application);
- Harvesting;
- Processing (to be set up only when at least 4,000 ha of land is developed in oil palm);
- Rehabilitation to forest; and
- Abandonment.

The key activities anticipated for the proposed **ITP development** are:

- Land clearing and site preparation;
- Infrastructural development (mainly access road and drains);
- Planting, maintaining and protecting;
- Harvesting and transporting wood from plantations; and
- Reforestation of harvested areas and abandonment.

1.3.5 Project Status

At the time of this SEIA, a large portion of the proposed Project area is either timber salvaging in progress (approx. 43,503 ha), planted with *Acacia mangium* under the JV SSB Planting Tree Project (approx. 24,652 ha), or re-entry logging in progress (approx. 19,492 ha). The logging operation is carried out by Rakyat Berjaya Sdn Bhd[1h] while land clearing and planting of *Acacia* is done by Sabah Softwoods Bhd[1i].

1.3.6 Project Options

If the Project area was not to be developed into an oil palm plantation, Rakyat Berjaya Sdn Bhd and its logging contractors would continue to log the area until their license expires (99 years).

1.3.7 Site Option

Due to the massive size intended to develop an oil palm and industrial tree plantations area, no other site was considered by the Project Proponent. There was an alternative site proposed by one of the review panel members, i.e. the Sg. Pinangah Forest Reserve with an area measuring approximately 191,652 ha (Source: Sabah Forestry Department). However, due to ISO certification and close proximity to the Maliau Conservation area, this site was considered less favourable.

1.3.8 General Land Use and Its Surroundings

The proposed area is classified as Lowland Mixed Dipterocarp Forest. The area has been logged during the 1970s, 1980s and more recently during the 1990s.

There is no human settlement except workers' base camps within the logging areas. The closest settlement is the Luasong Forestry Centre and Kg Fajar Harapan Luasong, which is sited between Benta I and Benta IIC area. Other land uses surrounding the proposed Project area include the international collaboration forestry projects: the INIKEA Sow-a-Seed Project, the RBJ/NEP RIL Project and the SUAS Research Project. Further away are two world-renowned conservation areas, i.e. the Danum Valley Conservation Area and the Maliau Basin Conservation Area.

[1h] Rakyat Berjaya Sdn Bhd, a wholly owned subsidiary of ICSB is established to manage the forest concession on YS under the SFMLA and the TPFMA of BWSB.

[1i] Sabah Softwoods Bhd, a subsidiary of ICSB is the only large-scale commercial forest plantation company in Malaysia. SSB has currently developed 82% of its 60,000 ha of its area. Fast growing forest tree species 36,000 ha, including 18,000 ha of Acacia, 10,000 ha of Albizzia, 6,000 ha of Gmelina, and 2,000 ha of pine and eucalyptus. Agricultural crops cover 14,900 ha of oil palm and 100 ha of cocoa. During its 26 years of operation, SSB has planted cumulatively 68,034.5 ha of agriculture and forest plantations.

1.4 Key Environmental Impacts, Recommended Mitigating Measures and Compliance Monitoring Requirement

Based on the assessment, the anticipated key environmental issues that would be affected by the proposed forest harvesting operation are:

- Increased soil damage/ erosion and risk of slope instability
- Increased sediments load and deterioration of water quality
- Disturbance to the hydrological cycle and drainage pattern
- Loss of biodiversity
- Destruction of wildlife habitat
- Destruction of floristic rich habitat
- Impact on the socio economy
- Increase of biomass generation
- Potential pests and disease problems
- Risk of forest fire

Details of the assessment, mitigating measures and monitoring of the key impacts are summarized in **Table 1.4.1**.

Table 1.4.1 Impacts, Mitigating Measures and Compliance Monitoring for the Proposed Oil Palm Plantation (OPP) and Industrial Tree Plantation (ITP) at Kalabakan and Gunung Rara Forest Reserves, Tawau District, Sabah.

No.	Impacts	Mitigating Measures	Monitoring Programme
1.	**Soil Erosion**		
	Soil damage & nutrient loss Soil instability Deterioration of water quality Disturbance to aquatic life Increase in sediment loads	Recommended **Preservation of Riparian Reserve** for the proposed OPP and ITP Plantation **Streams Width** — **Minimum width of Riparian Reserve (x2)** Less than 3 m — 5 m 3 m – 20 m — 30 m > 20 m (Sg. Tiagau) — 100 m **Special consideration:** Sg. Brantian (up to VJR) — 250m Sg. Kalabakan & Anjeranjermut — 1000 m **To be maintained:** Sg. Kuamut — 5 km *Note: In area identified as "high risk", the width of the riparian reserve should be 1.5 times bigger that the above recommendations.*	Exclusion to be mapped on a 1:10,000 map scale. Marking on the ground or on the tree at 1.5-m height on the demarcation of riparian reserves. Photo (with date), GPS locations and map to be included in the Compliance monitoring Report. Monitoring of water quality upstream and downstream of the Project site. The parameters include *TSS, turbidity, oil and grease*. Other information such as GPS location, stream width, surrounding land use must be provided too.
		Dominant drainage paths on cleared areas shall be rehabilitated with fast growing creeper plants to prevent formation of soil erosion channels.	Photo (with date) and GPS location of the drainage system.
		Tractors must be of small size and equipped with brush rake in place of earth moving blade, in order to minimise soil disturbance and compaction. The brush rake should be moved above the ground surface without touching the ground to prevent soil disturbance and forming of rill erosion.	Photo (with date) of machinery used for land clearing and preparation.

No.	Impacts	Mitigating Measures	Monitoring Programme
		In reopening of old skid trails, the layer of accumulated litter and matted roots should be retained in order to reduce erosion and compacting soils.	Marking on the map with geographical coordinates. Photo (with date) and GPS locations to show the access roads including any failure.
		Table drains, culverts and other drainage structures to channel run-off water to road-side filter strips prior to entry into streams should be installed concurrently with road construction.	Marking of proposed roads on the map and ground checking for the width of roads, drainage system and gradient. Photo (with date) and GPS location of the filter strips especially in the high-risk area.
		Table drains should be seeded with grass to prevent erosion of drainage banks and to prevent formation of erosion channels.	Site inspection – during rehabilitation works. Any failures should be noted.
		Road grade should not exceed 15% (8 degrees).	Photo (with date), GPS location and mark on map for such structures.
		Roads should not cross main streams unless appropriate crossing structures (e.g. culverts or bridges) are built.	Map showing the road with approximate area for each of them and photo (with date) for structures built across the river.
		Blading off of roads should not be permitted. It should only be allowed if damage is minimal and subsequent drainage and repair is possible.	Photo (with date) and GPS location for any failure or collapse structure.
		Table drains should be provided for and roads should be appropriately cambered, crowned, insloped or outsloped as appropriate to the circumstances to ensure water drains from road surfaces.	Photo (with date), GPS location and mark on map for such structures.
		Avoid pushing excess spoil into gullies and the edges of road embankments during road maintenance. Spoil should be compacted '*in-situ*', or transported to disposal sites away from the road, thus minimizing erosion of roads and sedimentation of waterways.	Site inspection – during rehabilitation works. Any failures should be noted.

No.	Impacts	Mitigating Measures	Monitoring Programme
		Provide filter strips along the roadsides to help to reduce siltation of river systems and to prevent an increase in the intensity and frequency of peak flows into the river system downstream of the land clearing activities. Where filter strip is not possible, silt trap is encouraged at all drainage outlets, prior to discharge into streams to reduce suspended sediment loading. Silt traps should be maintained regularly. Disposal from silt trap should not be done adjacent to rivers, streams, creeks or any drainage.	Photo (with date) and GPS location of the filter strips and silt traps, especially in the high-risk area.
		Machinery should be avoided to operate in the streams.	Photo (with date) showing compliance to this.
		All culverts should have cut-off wall to prevent erosion under the pipe. The head and outlet walls of culverts should be stabilized with log or stone pitched walls. Culvert gradients should ideally be 1-3%. Contractors should ensure that proper drainage is installed in order to reduce soil erosion and runoff.	Photo with date and GPS locations of all drainage system including any failures.
		Removal of biomass should be carried out during suitable time period, proper methods and procedures and selection of machineries to reduce unnecessary surface erosion.	Photo (with date) and GPS location of the stacking of biomass and the location of burning at the field.
		Soil Protection - Terracing Slope between 12^{o} and 20^{o} should be terraced for better result in the field, improved access and water retention.	Marking of slope between 12^{o} and 20^{o} on the map and in the field. Photo (with date) of terracing in the field.
		Protection of Steep Area ➢ The steep ridges should be conserved for flora conservation and ecological protection. This includes the steep ridges in BW1/01, BW2/01,	Development Plan in 1:10,000 scale map. Photo with date and GPS locations showing the marking or painting on the trees.

No.	Impacts	Mitigating Measures	Monitoring Programme
		BW3/01, BW9/00, BW9/03, BW9/02, BW3/00, BW2/99 and BW4/00(A). ➢ These ridges are the natural link to the forest outside the proposed Project site. They also served as wildlife temporary refuge especially during the salvage harvesting and land clearing stages as well as natural barrier to poachers and sources of shelter and food for the animals when the plantation is established.	Aerial surveillance/ monitoring once in every six months. Regular ground monitoring (at least once a month) during land clearing and planting works. Since the area is developed in phases, the monitoring points should be those that are accessible at the time of monitoring.
2.	**Hydrological Impact**		
	Changes to hydrological cycle and drainage pattern	**<u>Water Yield Management:</u>** ➢ Land clearing should only be carried out during the dry weather. ➢ Commence planting soon (e.g. 1 month) after site clearing. ➢ Refrain from clearing of areas where slopes are more than 25^{o} and soils are shallow. ➢ The areas should be limited by heavy machines during land clearing and preparation. ➢ Suspending tractor traffic during wet periods to avoid excessive compaction. ➢ Establish long term rainfall and flow gauging stations to monitor the impact on the river baseflow.	Marking on map the boundary of each Project phases. GPS location and photo (with date) showing the land clearing activities carried out in phases. Records of rainfall and flow gauging stations that are established.
		<u>Reduction on the flood levels:</u> Exercise proper management practices, develop Project area in phases i.e. in 5 phases of 500 ha to 7,500 ha, planting of cover crops immediately after clearing and maintaining adequate streamside buffer strips.	Map showing details of phased development. Photo (with date) showing cover crop establishment and maintenance of riparian reserves and buffer belts.
		<u>Protection of water quality from sediment yield:</u> ➢ Develop plantation in phases and scheduled over drier period or months.	Photo (with date) of measures taken to protect water quality from sediment yield. Provide map to show

No.	Impacts	Mitigating Measures	Monitoring Programme
		➢ Lay roads carefully, preferably following the contour and must be far enough from stream. ➢ Clearing should be done parallel to contour lines, starting from high to low ground. ➢ Install cross drains for minimising overland flow. ➢ Timing of road construction or road upgrading to conform to periods of less rainfall and allowing sufficient time for earthworks to stabilise. ➢ Using the appropriate machineries in the land clearing to minimize disturbance to the soil. ➢ All clearing, grading and stabilization operations would be done before starting the next phase. ➢ Where possible, the stages of development should be from the high to low grounds, so as to take advantage of the present vegetation to act as silt and runoff barriers. ➢ Reduce the duration (max. 3 months) of land exposure to natural elements. ➢ No person shall carry out any tree felling, building or structures erecting and other works within the buffer strips.	locations.
3.	**Wildlife and Aquatic Ecology**		
	Human impact on wildlife populations Fragmentation of habitat and wildlife ranges Loss of biodiversity, rare species and key habitats	**Hill ridges above 650m and over 25 degrees** must be protected. These ridges include: ➢ Along BW9/00 (links with the river buffers of Sg. Anjeranjermut and Sg. Kalabakan and westwards to Maliau Basin); ➢ Along BW1/01, BW2/01, BW3/01 and northern forested area; and	GPS location, photo (with date) showing the marking on the trees at 1.5-m height at the base limits and map (1:10,000) showing the surveyed area.

No.	Impacts	Mitigating Measures	Monitoring Programme
		➢ Along buffer belt of Sg. Brantian towards the Brantian – Tatulit VJR.	
		Mud Volcano Protection Incorporate the mud volcano and salt lick area into the 1000-meter riparian reserve of Kalabakan and Anjeranjermut rivers and the Kalabakan-Sapulut road.	Map showing the boundary of the 1000-m riparian reserve. Aerial surveillance to check for any infringement. Photo (with date) and GPS location of the marking on the ground or trees at 1.5-m height showing the protection area.
		INIKEA Project Protection A buffer of 1 km is prescribed to prevent any edge effect on the Project and to avoid encroachment.	Map showing the boundary of the 1-km buffer. Aerial surveillance to check for any infringement. Photo (with date) and GPS location of the marking on the ground or trees at 1.5-m height showing the protection area.
		Brantian-Tatulit VJR Provide at least 100 m buffer around the **VJR**.	Map showing the boundary of VJR and the buffer. Aerial surveillance to check for any infringement. Photo (with date) and GPS location of the marking on the ground or trees at 1.5-m height showing the protection area.
		All main access roads should have a buffer of 100 metres.	Photo (with date) and GPS location of the marking on the ground or trees at 1.5-m height showing the buffer zone.
		Establish *in-situ* and *ex-situ* conservation programme at BW1/00, BW9/00 and BW9/03. Inventory of the flora and fauna could be initiated and a genetic conservation programme established. Rare and unique plants are to	Photo (with date) and GPS locations of the marking or painting on the trees.

No.	Impacts	Mitigating Measures	Monitoring Programme
		be collected and established within a suitable site e.g. on terrain above 20 degrees.	
		Draw up a proper forest rehabilitation programme so that preparation can be made nearing to the end of the 30 year oil palm cycle.	Preparation of a forest rehabilitation plan.
		Proposed Wildlife Corridor This area, measuring 210,000 ha is sited outside the Project site (southwest of Benta IIC) but within the YS concession area. It links the forest down south to the Kalimantan border.	Documentation of area set aside as wildlife corridor. Provide map and photo (with date).
		No hunting or trapping of wildlife within and surrounding the Project area.	Regular check for any sign of hunting activities at all the base camps.
		Install security gates in all the entry and exit points in all the designated coupes and the Project Proponent can assist by manning the main gates in Kuamut and Kalabakan areas. Keep records of logging trucks leaving the Kalabakan gates.	Photo (with date), GPS location and map showing road within the plantation area. Provide record on the vehicular movement in and out of the Project area.
		Directional clearing or felling of trees towards forested area.	Development Plan with direction of clearing shown. Regular ground surveillance especially in the planting areas.
		In the event any wildlife is trapped or hurt during land preparation, Sabah Wildlife Department must be informed and the Project Proponents should provide all the resources to assist the Department.	SWD to monitor and Project Proponent to assist.
		Wildlife Enactment compliance: Inform the Sabah Wildlife Department at least 30 days prior to Project commencement.	SWD to monitor.

No.	Impacts	Mitigating Measures	Monitoring Programme
4.	**Managing Human-Animal Conflict**		
	Damage to oil palm plantations	To keep elephants away from plantations, establish electric fencing around the proposed site. For orangutans, they can be captured and relocated easily. Short-term control for wild pigs can be done by using crackers to scare them. Other method would be by fencing. For porcupines, galvanized zinc collars can be place around the palms.	Records of animal intruding into the plantations and actions taken to remediate this conflict. Provide also photos (with date).
5.	**Biomass Management**		
	Biomass generation	Stacking of vegetative waste along the contour	GPS location and photo (with date) showing the stacking of biomass in the cleared area.
		Explore alternative method of biomass disposal such as *in-situ* mulching or chipping.	The Project Proponent to look into these possibilities with consultation with the relevant authority.
		Practice composting for waste products generated by the oil palm processing mills.	Photo showing composting being practiced at oil palm mills.
6.	**Fertiliser Application and Pests and Diseases Management**		
	Incorrect application of fertilizers Judicious use of pesticides	Avoid application of fertilizers, pesticides and weedicides during the wet season and windy conditions. Fertilisers should also be applied in split doses.	The Project Proponent to closely monitor this by keeping proper records of each application.
		All chemicals used should be approved by the Pesticide Board. The frequency, dosage and timing of chemical application should be monitored closely. Practice biological control and other environmental friendly methods to control weeds and mammalian pests whenever possible.	The Project Proponent to take into consideration in the development plan, with documentation of consultation with the relevant authority.

No.	Impacts	Mitigating Measures	Monitoring Programme
7.	**Forest Fires**		
	Risk of forest fire	Establishment of fire break belt of 50 m around the perimeter of plantation area.	GPS location and photo (with date) showing the demarcation of fire break belt.
		Set up a team of trained forest fire fighting team and provide them with all the necessary equipment.	The Project Proponent to take action.
		Limit the size of clearing and planting to reduce the biomass built up.	The Project Proponent to taken into consideration during the development phase.
		Establishment of permanent water supply point with vehicle or helicopter access.	The Project Proponent to identify the location and provide the locations with GPS reading and maps to the fire fighting team.
8.	**Socio-Economics**		
	Provision of Employment Opportunities for locals Risks to human health at the base camps within the project area	Work priority should be given to the suitable local villagers.	Keep a record of workers and their particulars.
		If foreigners were employed, proper procedures must be followed.	Relevant authorities to monitor.
		All workers to go through medical check prior to employment and emphasis on communicable or infectious diseases especially Malaria, TB or others every 6 months	Provide the audit team with the worker's medical records.
		Provision of basic facilities and utilities (portable or clean water, mosquito netting and sanitary facilities)	Photo (with date) and GPS location of the base camp, name of contractor, logging coupes or planting block to be provided in the Compliance Monitoring Report.
	Pollution by improper waste disposal in the project area	Refuse to be disposed off in pits approx. 30m from waterways and above water table. Cover refuse with soil once a week.	Photo (with date), GPS location of the dumping ground and general layout of the base camp, name of contractor and plantation areas.
		Storage tank, if any, should be constructed on stable ground with bunding and at least 50 m away from waterways.	GPS location and photo (with date) showing the location of the storage facilities.
	Water resource degradation and siltation	Ensure good site development practices e.g. conservation of riparian reserves, soil erosion minimization, etc.	Photos (with date) to show good practices on ground.

No.	Impacts	Mitigating Measures	Monitoring Programme
		Cooperate with communities and local authorities on solving water supply issue on the directly affected communities.	
		Regular monitoring of water quality.	Compliance report to EPD once in every 3 months.
	Dust and Noise Pollution	Proper maintenance of vehicles.	Records of maintenance carried out for vehicles.
		Gravelling or bitumenising of roads around the plantation office, village and living quarters. Introduce tree-covered buffer zone around plantation area. Install appropriate signboards and establish speed humps at LFC to reduce speed. Re-adopt the use of washing trough in LFC.	Photo (with date) and map showing roads, speed humps and tree-covered buffer zone around plantation area, installation of signboards, speed humps and use of washing trough in LFC.
	Loss of aaesthetic value especially along Kalabakan-Maliau Road	Aesthetic visual – provide 1000 m buffer on both side of the Kalabakan-Sapulut main road.	Map showing the demarcation of the buffer and ground checking of the marking of the buffer zone.
	Road Safety	Proper traffic signboard at appropriate spots especially near T-junctions or settlement area.	Photo (with date) and GPS location of the signboard.
		Damage section of road should be repaired immediately.	Photo (with date) and GPS location of any damaged road.
9.	**Project Abandonment**		
	Disturbance land area	Re-establish all open area with fast growing indigenous species or fruit trees	Project Proponent to take action Photo (with date) and GPS locations showing the re-establishment works on site.
	Visual impact on abandoned camps and mills.	Remove all building structure to discourage any illegal squatter activities. Remove all solid and liquid waste. Rehabilitate all main roads.	Photo (with dates), GPS location of roads and map for the plantations.
		Remove all machinery and equipment to recover cost.	Project Proponent to take action.
	Security of the Project area	Retain the security gates into the plantation areas.	Project Proponent to take action.