



## **Forest Resource Utilization and Plantation Development Project**

### **ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**M & S Company Inc.**  
September 2019

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## **Executive Summary**

### **A. Project Fact Sheet**

Project Name	Forest Resource Utilization and Plantation Development Project under Integrated Forest Management Agreement (IFMA) Numbered 18-2007
Proponent	The IFMA No. 18-2007 covering the Municipalities of Esperanza, Lebak, Kalamansig, Bagumbayan, and Senator Ninoy Aquino, all in the Province of Sultan Kudarat, Region XII SOCCSKSARGEN
Nature of Project	Harvesting operations, plantation development and forest protection and maintenance activities
Size / Scale	Approved IFMA area covering a total of Twenty Nine Thousand Eighty Five (29,085) hectares
Rationale	<p>*The IFMA 18-2007 original area of 1,555 hectares was approved in the year 2007 but pending its release, until the M&amp;S Company secured the Free Prior Informed Consent (FPIC) from National Commission on Indigenous People (NCIP). Then, the approved Certificate of Pre-condition was issued by NCIP Main Office last April 13, 2009. Thus, DENR officially released the approved IFMA License denominated as IFMA No. 18-2007 last May 27, 2009.</p> <p>*Since the IFMA 18-2007 with 1,555 hectares are accessible and contiguous to Silvicultural Industries, Inc. (SII) under IFMA No. 022 with 27,530 hectares, the MSCI management decided to consolidate, merge and integrate the SII IFMA 022 to MSCI IFMA 18-2007 for its effective management, supervision and control of the entire consolidated IFMA area.</p> <p>*On June 17, 2015, the DENR issued the approval of the integration / consolidation of the IFMA 022 into IFMA 18-2007 for better and effective management, supervision and control of the accumulated area of 29,085 hectares</p> <p>The overall objective of this consolidated project is for the company to continuously develop, improve, protect and manage the whole area of 29,085.0 hectares under IFMA No. 18-2007 into a sustainable and productive combination of the natural and plantation forests that will support the requirements for timber and non-timber forest products supply for its affiliated wood processing plant and the local market; and attain ecological balance and efficiently functioning ecosystem by means of sustainable management.</p>



		<b>Present Land Use/Vegetative Cover</b>	<b>Area (has)</b>	<b>Development and Management Strategies</b>	<b>Allocation of area (has)</b>
		Production Residual  Forest (PRF)	2,116	* Manage as production natural forest where selective timber harvesting will be implemented pursuant to DAO 99-53 but subject to the lifting of E.O 23 and other forestry laws and regulations.  * Maintain as production natural forest.	<b>2,116</b>
		Degraded Residual  Forest (DRF)	12,038	*Develop and manage into industrial forest plantation based on the exemption of E.O 23.  * develop as protection or buffer zone forest.	<b>9,823</b>  <b>2,215.00</b>
		Established Plantation	10,442	* Continue protecting and managing as forest trees plantation	<b>10,442</b>
		Cultivated/ Agroforestry Areas	1,043	* Continue protecting and managing as forest tree plantation/ fruit tree plantation and Other High Valued Crops plantation such as, rubber trees, oil palm or coffee tree plantations.	<b>1,043</b>
		Open / Brush Land	2,713	* Maintain as productive cultivated /agro-forestry area.  * Develop into mix fruit tree plantation and palm oil or rubber trees plantation.	<b>2,713</b>
		Resettlement Area	733	* Manage in place and resettled forest occupants.	<b>733</b>
		<b>TOTAL</b>	<b>29,085</b>		<b>29,085</b>
Components	<ul style="list-style-type: none"> <li>Road Network Rehabilitation / Maintenance</li> <li>Harvesting of Matured Forest Trees Plantation</li> </ul>				

	<ul style="list-style-type: none"> <li>• Harvesting of Degraded Residual Forest based on item 2.2 of E.O 23 guidelines and once memo on suspension of logging for natural species is lifted</li> <li>• Selective Logging System and Enrichment Planting or Timber Stand Improvement for Production Residual Forest (Once E.O 23 is lifted)</li> <li>• Nursery development</li> <li>• Plantation Development</li> <li>• Forest Protection and Maintenance</li> <li>• Infrastructures development and maintenance</li> <li>• Community Development</li> </ul>
Process / Technology	<p>The general strategy for the whole project is to fully utilize the productive potential of the IFMA area to produce wood raw materials and agricultural food crops, with the least adverse effects on environmental stability and generate optimum socio-economic benefit for the LGUs, the company, the IFMA community particularly the Indigenous Peoples, and other forest occupants in a sustainable manner possible. The logs produced from the area will be processed in the company's existing wood processing plant in Barangay Recodo, Zamboanga City.</p> <p>The company will use a manual labor and / or mechanized logging activities using carabao logging or wrecker / skyline depending the status of operations, or as the need arises. While silviculture and thinning will be undertaken to ensure quality tree growth.</p>
Products	Timber / round logs
Major Waste Streams, Types & Estimated Generation Rate	Logging residue (slash, stumps) – Approx . 50% of biomass
Manpower Requirement	<p>Operations Phase – Male 482; Female 123</p> <p>Abandonment/Decommissioning Phase – Male 188; Female 5</p>
Project Investment Cost	<b>Php 6.5 Billion</b>
Project Duration and Schedule	<p>Remaining 14 Years of 25-year IFMA: CY 2019 to CY 2032</p> <p>Operations Life: 25 years and renewable for another 25 years thereafter</p> <p>IFMA Expiry: December 31, 2032</p>

## **B. EIA Process**

This section documents the process undertaken in the conduct of the Environmental Impact Assessment.

### **EIA Team**

<b>Name</b>	<b>Expertise</b>	<b>Module Assigned</b>	<b>DRRCC-Trained</b>
Rodrigo B. Mallonga	Environmental Planning, civil engineering, water management	All	Yes
Corazon M. Baylon	Socio-Economics	People	Yes
Hannah R. Molde	Industrial engineering	People	No
Raul R. Buñao	Forestry	Terrestrial Flora	Yes
Zita M. Rosales	Environmental Management	All	Yes
Realyn C. Gonzales	M&S Company Inc.	All	No

### **EIA Study Area**

The study area was focused on the perceived direct impact areas which include the proposed IFMA area at Barangay Pamantingan in the Municipality of Esperanza and the existing IFMA areas in the municipalities of Lebak, Kalamansig, Senator Ninoy Aquino, Bagumbayan, and Esperanza, all in the Province of Sultan Kudarat. Specific locations for the IFMA and sampling stations for each module are identified and discussed in the succeeding sections.

### **EIA Study Schedule**

<b>Activity</b>	<b>Period Covered</b>	<b>Weather/Season</b>
Site Inspection	August 26, 2018	Rainy
Terrestrial Flora and Fauna Assessment	August 27 – 31, 2018	Rainy
Socio-economic & cultural research	August 27 – 31, 2018	Rainy
Public Scoping	August 30, 2018	Rainy
Public Participation / IEC	March 26-30, 2019	Sunny
Air Quality Assessment	April 26, 2019	Sunny
Water Quality Assessment	October 24, 2018 May 2019	Sunny Rainy

### **Key EIA Methodologies**

The EIA approach and methodology was based on the Revised Procedural Manual of DAO 03-30.

Consistent with data and information requirements indicated in the approved Technical Scoping Checklist, the EIA study team conducted both primary and secondary data collection for the period August 2018 to November 2018. MSCI commissioned BSI to conduct air quality and noise monitoring in April 2019.

	Methodology
Land Use	Ocular survey, interviews, secondary data gathering
Terrestrial Flora	Quadrat sampling and transect survey
Terrestrial Fauna	Opportunistic survey, interviews
Water Quality	Multiprobe water quality instrument (PASCO Advance Water Quality) for ph, DO, and water temperature; grab sampling for BOD, oil and grease, and organic phosphorus, nitrates, phosphates as phosphorus, total coliform and <i>E. coli</i>
Aquatic Ecology	Macroinvertebrate surveys, aquatic vegetation audits, and rapid assessment techniques
Air Quality	High volume – gravimetric method for TSP and PM10
Noise Level	50 readings (Wilson 1989); direct reading sound level meter (A-weighted dBa scale)
People	Socio-economic survey, Key Informant Interviews, Focus Group Discussions, informal interviews

Sources of secondary data include:

- Provincial Government of Sultan Kudarat
- Municipal Governments of Lebak, Kalamansig, Senator Ninoy Aquino, Bagumbayan, and Esperanza
- Barangay LGUs of Pamantingan and Salumping
- National Mapping and Resource Information Authority (NAMRIA)
- Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
- Philippine Institute of Volcanology and Seismology (PHIVOLCS)
- Philippine Statistics Authority (NSO)
- Mines and Geo-Sciences Bureau (MGB)
- National Water Resources Board (NWRB)
- Department of Health (DOH)

Published and unpublished information was supplemented with primary data obtained through actual sampling and field surveys. Dialogues, liaison, coordination meetings, focus group discussions and interviews were also conducted with M&S Company, tribal leaders, and local officials. A list of references is presented in Chapter 8.

### **Scoping and Public Participation**

The series of public consultations conducted during the EIA are presented in the table below. Documentation reports and attendance sheets are attached as **Annex A**.

<b>Date</b>	<b>Activity</b>	<b>Stakeholder/ Community</b>	<b>Issue</b>	<b>Proponent's Comments/Response</b>
August 27, 2018	Focus Group Discussion	Tribal Leader – Barangay Legodon	Whether trees outside established plantations will be cut	IFMA area will remain an IFMA area, the company will only cut what they have planted; and then conduct reforestation activities.
			Girdling of forest trees near coffee trees	DENR and LGU have been informed and the girdling has been documented
		Barangay Kagawad – Margues	Damage to coffee trees planted under or near harvestable forest trees in established plantation during harvesting of mature forest trees	There is already an agreement with IPs that they would not get mad if the coffee trees are damaged as they have been informed in past meetings that mature forest trees in established plantations will be harvested
		School Head – Plamango Integrated School (Pamantingan)	Positive remarks about assistance in school construction, scholarships (most beneficiaries are IPS), school equipment, supplies, Increase in literacy rate, additional salaries of teachers, etc.	
		SUKITA Chairman , a T'boli and Catholic religious leader	Thankful for construction of church and chapel	
		HATCOO Board of Director	Cooperative was able to deliver services due to M&S Company's assistance	
<b>Date</b>	<b>Activity</b>	<b>Stakeholder/ Community</b>	<b>Issue</b>	<b>Proponent's Comments/Response</b>
August 27, 2018	Focus Group Discussions	Tribal Leader - Barangay Margues	Benefits from M&S Company - free 'bukag' or basket, other farming supplies and plants; tilling of land for ease of farming. The IPs were also given titled area for	

			settlement and farming. Initially, the area was 7 hectares for 7 families. Now, the settlement/farming area expanded to 25 hectares for 25 IP (Dulangan Manobo) families. They were also given houses	
			Some IPs want to farm corn instead of coffee	
		Barangay Captain - Pamantingan	Positive remarks about the company	
August 30, 2018	Public Scoping	Barangay Kagawad - Pamantingan	Whether there will be compensation for coffee trees damaged during harvesting of mature forest trees	If coffee planted without permission, no compensation as agreed during previous consultation meetings
		Asst. Municipal IFMR	Will IPs be prioritized for employment	Yes. IPs prioritized. Need employees for harvesting operations since no tractors will be used, mainly manual skidding
		Municipal LGU Representative	Will harvesting cause flooding	No threat of flooding. Only plantation trees harvested. Natural forest protects against flooding.
		Female resident - Salumping	Employment opportunities for women	Women are preferred for nursery operations, especially IP
		Female resident - Pamantingan	Sufficient seedlings for planting	Yes, we have sufficient seedlings in the nurseries ready for planting
		Tribal Leader – Margues	Positive remarks on project employment opportunities	Thank you
<b>Date</b>	<b>Activity</b>	<b>Stakeholder/Community</b>	<b>Issue</b>	<b>Proponent's Comments/Response</b>
March 26, 2019	IEC / FGD	Edgar Arguelles Senator Ninoy Aquino, Barangay Kagawad, - Committee In-charge on Environmental and Natural Resources	access of Brgy ENRO to pass through IFMA area in going to other side of Sitios of its barangays for immediate response / abate their IP	Secure clearance or resolution from barangay stating the name of Brgy. ENRO as authorized person and coordinate with management /security checks points to avoid communication gaps



			constituents involved in forest destruction that is outside of the M&S IFMA area.	in relaying clearance request to the management or thru VHF radio communication
		Jett Paches, Teacher Incharge	*School provisions for junior and senior high	*Make a written request to be supported by general PTCA and Barangay Resolution subject for review and approval of the Management for possible inclusion to the Corporate Social Responsibility of MSCI.
		Datu Tuga Legal, from Indigenous People Sector	*No Issues raised, rather said "We have no problem with the IFMA operation of M&S Company Inc. here. We must all follow the policy and unite to achieve progress."	
		Women's Sector	*Seeking for alternative and suitable livelihood program	*To possibly tap TESDA / DOST for skills and capacity building activity for women and assist in identifying alternative livelihood programs that may be applicable or effective for them.
		<b>Barangay Government Unit Sector</b>	*Infrastructure like roads from farm to market road	* Through Joint infrastructure, M&S can provide the fuel while the equipment will be sourced out from the barangay or the other way around.
		MASANAK, People's Organization sector	*Due to the soil type of our area as limestone, we are experiencing scarcity of water source for drinking water, thus we need a sufficient drinking water supply in our barangay.  *We targeted to acquire for a water tanker that will distribute water	Proper documentation and requisition of concerned shall be forwarded along with a barangay resolution. Issues were noted for presentation to the management.

			from household to household.	
		Inter – faith, Religious Sector	*Gathering for inter-faith activities with no any musical equipment used	A written request for musical instrument shall be forwarded and accompanied by a Barangay Resolution
<b>Date</b>	<b>Activity</b>	<b>Stakeholder/Community</b>	<b>Issue</b>	<b>Proponent's Comments/Response</b>
March 28, 2019	Keytodac, lebak Sultan Kudarat	Asked a Representative from Indigenous People (IP) twice but to no avail of raising issues or concern to M&S		
		Evangeline, President of Women's Association of Keytodac:	*Asked for individual planting materials from the company for individual planting on their own land.	In support for National Greening Program in allocating planting materials for communal use, M&S will provide planting stocks as long as formal or written requisition is forwarded indicating planting or area allocation.
		<b>Integrated School, Head,</b> said graduating class (Grade VI)	*Has a tree planting activity, and they need seedlings and area allocation for planting.	*Advised to submit formal or written request thru Brgy Resolution / Endorsement for planting material needs and ensure that the planting area is outside of the IFMA
		Mr. Benny Castro, former Secretary and kagawad of Keytodac	*has pending Permit to Cut application last 2017, but comes an issuance of total log ban. Since, log ban for plantation was lifted, he wants to get a permit.  *Chainsaw registration, stated pruning, instead of cutting permit.	*CENRO Ali Sampal advised Mr. Castro to bring his copy of cutting permit application to DENR for appropriate action, endorsement and approval.  *DENR prevents similar incidents in the past wherein Lauan species, instead of the agreed Gmelina, were cut and placed inside the bulks of felled Gmelina trees.  The applicant should indicate he has an

				existing plantation be it thru a Certificate of Plantation, otherwise they will assume it is for pruning and not for tree cutting.
		Rolando Suesa, from Religious Sector, Keytodac, Lebak, SK	Ask assistance in the rehabilitation of now dilapidated Chapel which was donated by M&S in 1985	Building of said chapel using bricks was already approved by Victor Consunji thru the request of Bishop Quevedo. A follow-up letter is needed to bring this up to the newly installed President.
		Mr. Alexander Espanol, Brgy Captain of Keytodac, Lebak, SK	<p>*request planting materials such as any fruit trees like durian to gain economic benefits to my constituent.</p> <p>*Rehab Building for Barangay Request</p> <p>*assistance for a suitable road from farm to market road,</p>	<p>*Instead of Durian, the company can provide high yielding Vietnam Robusta coffee to avoid incidents of marketing struggles that are presently experienced in Durian.</p> <p>*To Submit Barangay Resolution for said request</p>
<b>Date</b>	<b>Activity</b>	<b>Stakeholder/Community</b>	<b>Issue</b>	<b>Proponent's Comments/Response</b>
March 30, 2019	IEC / FGD	IP Representative, Timbog Sandigan, Brgy. Sto. Nino, Bagumbayan	Can we plant our Coffee Trees inside Forest Area in Barangay Sto, Nino	<p>IPs are no longer allowed to establish coffee plantation within the IFMA Area. Otherwise it will be a precedent for girdling of trees by IPs to give more way for direct sunlight to their coffee trees.</p> <p>M&amp;S can provide planting materials for the IPs to be planted outside the IFMA premises</p>
		Brgy Captain, Jolito Inion, of Barangay Sto, Nino, Bagumbayan, SK.	Lack of Planting Materials for social project since, we require 5 pcs of tree planting for every couple prior marriage	The company can provide planting materials as long as proper requisition is forwarded
		Religious Sector	Lack of Financial Support for	Prepare a request prior to the conduct of

			transportation in attending Seminars and other Religious activities held outside	activity and specify the counterpart of both parties to identify key support
		Religious Sector	Church Building constructed and donated by M&S year 2007 but now dilapidated	Prepare a formal request to M&S for rehabilitation assistance
		Womens Sector	Financially constraint for transportation in attending Seminars and other Women's activities to be held outside	Prepare a request a week prior of the activity and specify the kind of support needed
		Youth Sector	Financially constraint for transportation in attending Youth Activities	Prepare a request a week prior of the activity and specify the kind of support needed

#### A. Summary of Baseline Characterization

The Land	The province of Sultan Kudarat's terrain is diverse with extensive coast, plains and valleys, hills and mountains.	
	The province has a total land area of 513,530 hectares of which 248,288 hectares or 48.4% are alienable and disposable while the rest are timberlands. (Map 2-1). The consolidated IFMA Project Area lies entirely within the timberlands area.	
	The existing vegetation within the IFMA area are as follows:	
	Vegetative Cover	Present Area (in hectares)
	Production Residual Forest	2,116
	Degraded Residual Forest	12,038

	Established Tree Plantation	10,442
	Agro-forestry/Cultivated Areas	1,043
	Open land/brush land	2,713
	Resettlement Area	733
	Total	29,085
The water	<p>The Project Area straddles portions of the Kabulnan 2 watershed and the Salaman watershed</p> <p>Kabulnan-2 has a drainage area of about 498.89 sq.km. (NIA, 2007) while Salaman River has a drainage area of 8,176 hectares (Provincial LGU of Sultan Kudarat, 2010) or 81.76 sq.km..</p> <p>There are three major river systems running through the IFMA areas: Tran, Salaman, and Kabulnan.</p>	
The Air	<p>Based on modified Corona's Climate Classification (1951-2003), the climatic condition in the province of Sultan Kudarat falls under Type III and Type IV climate type. Thus, the IFMA project falls under Type IV. Thus, characterized by rainfall which is more or less evenly distributed throughout the year.</p> <p>Based on the average of all weather stations in the Philippines, the mean annual temperatures of the areas in Sultan Kudarat Province with higher altitudes such as those in the Daguma Mountain Range is expected to be lower than those in the plains and valleys with lower altitudes.</p>	
The People	<p>The IFMA area is under the political jurisdiction of the municipalities of Esperanza, Senator Ninoy Aquino, Bagumbayan, Lebak and Kalamansig, all in the province of Sultan Kudarat.</p> <p>Majority of the inhabitant source of livelihood income comes from farming and fishing. The dialects spoken are mixed such as Ilonggo, Visaya, Teduray, Manobo and Muslim.</p>	

## B. Summary of Impact Assessment & Environmental Management Plan

Proj. Phase/ Envtl Aspect	Envtl Component likely to be Affected	Potential Impact	Options for prevention / mitigation	Cost	Guarante Fee
Pre-Operations					
*Survey & Mapping  *Road Rehab & maintenance  *Repair and maintenance of existing support facilities	Land	*Erosion   *Dilapidation of roads	*No logging operations allowed on highly eroded areas *Highly eroded areas and boundary should be properly marked in the map  *frequent road rehab and maintenance *avoid passing through during heavy rainfall		
	Air & noise quality	*Dust generation  *Noise pollution	*frequent watering of unpaved roads during dry period		

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	People	*Traffic / Transportation safety	*Controlled / scheduled movement to avoid road accidents / traffic occurrence		
Operations					
*Cutting and skidding  *Nursery Management  *Plantation development  *Hauling and Transport	Land	*Solid waste generation  *soil compaction  Landslide	* <i>Implement regular waste collection and disposal system at site.</i> <i>*Implement re-use, reduce and recycle</i>  *concentrate heavy equipment on few tracks as possible Installation of appropriate physical barrier (terracing, contour trenching, bund construction) to give the chance the roots to anchor		
	Air & Noise	*Dust generation  *Noise pollution	*frequent watering of unpaved roads during dry period <i>*hauling trucks must have canvass or any materials of same kind to cover backloads</i> *use heavy equipment during day time only		
	Water	Water quality degradation	*Prohibit direct disposal of waste to water bodies  *continue water conservation measures (protection of buffer zones -40 meters on both sides of rivers and streams)		
	People	Income generation to impact areas  Forest Fire	*priority hiring on local inhabitants esp. the IP's  *Formulate / implement programs on forest fire prevention and protection		
Post Operations					
•Information for abandonment to DENR and concerned LGU •Removal of facility / equipment at site •Revegetation of log areas	Land	*Solid waste generation  *Log over areas	* <i>Implement regular waste collection and disposal system at site.</i> <i>*Implement re-use, reduce and recycle</i>  <i>*should be revegetated with fast growing species</i>		
	Air & Noise	*Dust generation  *Noise pollution	*hauling trucks must have canvass or any materials of same kind to cover backloads  *use heavy equipment during day time only		



C. Summary of Environmental Monitoring Plan

Key Env't'l Aspect	Potential Impact	Parameter To be Monitored	Sampling & Measurement Plan			Lead Person	Person Responsible	Annual Est'd cost	EQPMT MGT COST				
			Method	Freq	Location				Eqpt Range				
<b>Pre-Operations</b>													
<ul style="list-style-type: none"> <li>Water Quality</li> </ul>	Siltation	TSP	Water sampling for lab analysis	Semi-Annual	*Tran river *Cabulanan River *Salaman River	PCO	In-house monitoring	500 / sample;  2 bottles / sample					
<b>Operations</b>													
<ul style="list-style-type: none"> <li>Land</li> </ul>	Solid Waste	Total solid waste generated	On-site inspection	quarterly	Inside IFMA area	PCO	In-house monitoring						
<ul style="list-style-type: none"> <li>Water Quality</li> </ul>	Siltation	TSP	Water sampling for lab analysis	Annual	*Tran river *Cabulanan River	PCO	In-house monitoring						

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					*Salaman River								
• Air Quality	Dust / Gas emission	PM 10 and TSP	Ambient Monitoring	Annual	*Bravo area  *Plamango Area	PCO	In-house monitoring						
• People	Health Profile	Top 5 causes of morbidity / mortality	Key informants interview	Semi-Annual	*Inside IFMA area	PCO	In-house monitoring						
<b>Post Operations/abandonment</b>													
• Land	Solid Waste	Total solid waste generated	On-site inspection	quarterly	Inside IFMA area	PCO	In-house monitoring						
• Water Quality	Siltation	TSP	Water sampling for lab analysis	Annual	*Tran river  *Cabulanan River  *Salaman River	PCO	In-house monitoring						

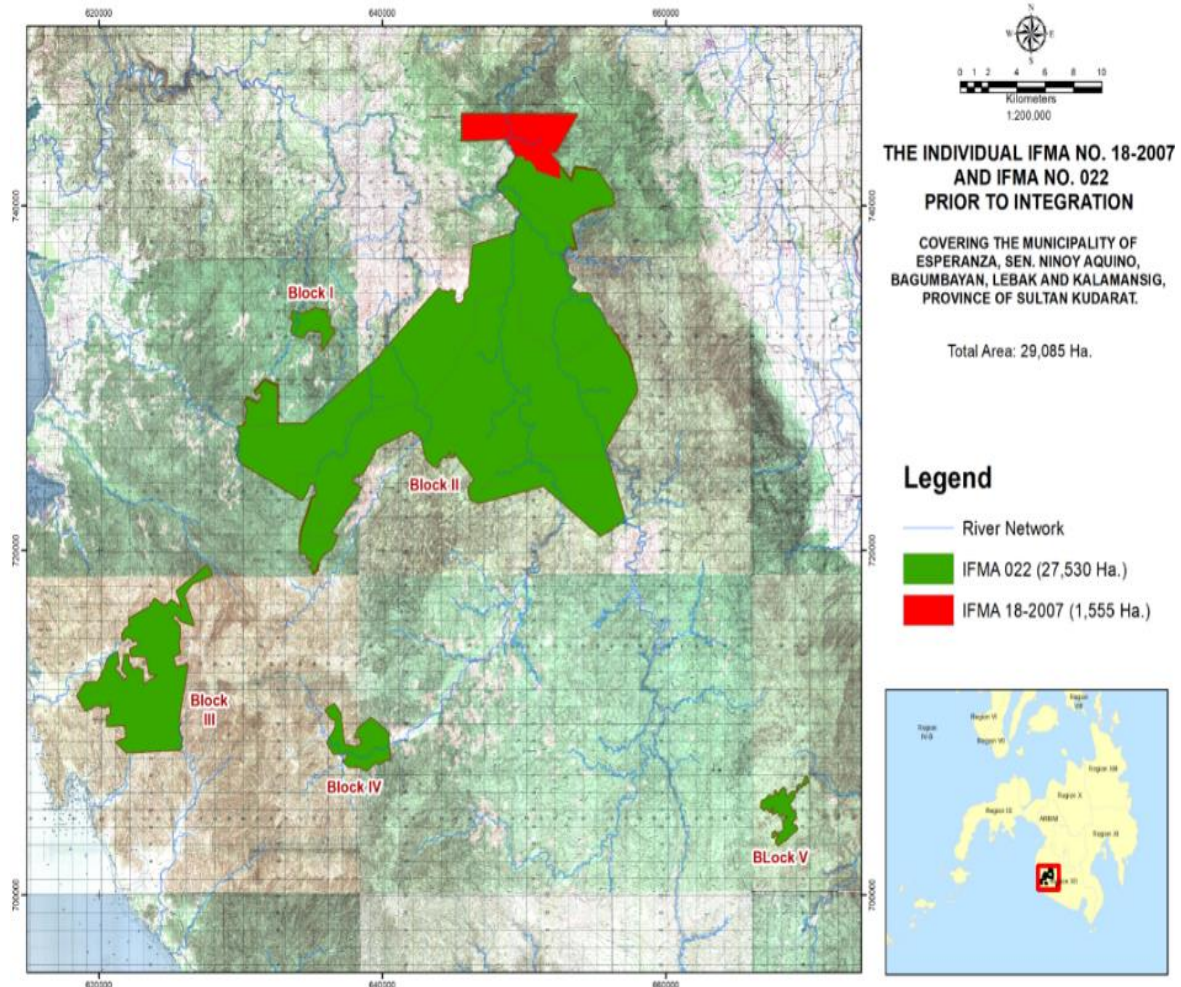


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## 1. PROJECT DESCRIPTION

M & S Company, Inc. (MSCI) is applying for an Environmental Compliance Certificate (ECC) for our project denominated as Integrated Forest Management Agreement (IFMA) No. 18-2007 with a total project area of 29,085 hectares.



Originally, M & S Company, Inc. has granted an Industrial Forest Management Agreement under IFMA No. 18-2007 covering an approximate area of 1,555.0 hectares of forestlands located in Esperanza, Sultan Kudarat on July 27, 2007 duly signed by then Secretary Angelo T. Reyes pending its NCIP requirement until the Free and Prior Informed Consent (FPIC) shall be secured from the National Commission of Indigenous Peoples (NCIP), which was subsequently issued and approved last April 13, 2009 by then NCIP Chairman, Atty. Eugenio Insigne. Thus, the approved IFMA No. 18-2007 was officially released by the Forest Management Bureau (FMB) Director Marlo Mendoza to M&S Inc last May 27, 2009. Because the area is accessible and contiguous to Silvicultural Industries, Inc. (SII) under IFMA No. 022 with an approximate area of 27,530.0 hectares, being managed by the same owner, the Consunji family, its management initiative and expertise in plantation development, they decided to consolidate, merge and integrate the SII IFMA 022 to MSCI IFMA 18-2007.

For effective supervision, control of the area, better management and protection of the existing established forest plantations and including the remaining natural residual forest located in the Municipalities of Lebak, Kalamansig, Esperanza, Sen. Ninoy Aquino and Bagumbayan, all in the Province of Sultan Kudarat, the IFMA No. 022 with an aggregate area of 27,530.0 hectares under SII was consequently integrated to IFMA 18-2007 of M&S Company Inc. from its original area of 1,555.0 hectares now aggregated a total area of 29,085.0 hectares after its approved integration

last 17 June 2015 which will remain in effect for a period of 25 years or until it expires on December 31, 2032.

Presently, the M&S Company Inc has only two (2) existing IFMA separately operates nationwide which are denominated as IFMA No. 18-2007 with an area of 29,085.0 hectares covering the five (5) municipalities located in in the Province of Sultan Kudarat and IFMA No. 99-001 with an area of 1,322.0 covering located in the Municipality of Malungon in Sarangani Province. Thus, the company has only a cumulative area of approximately 30,407.0 hectares nationwide.

It was also a perk that the company has an established reput e in the timber industry since its former consolidant had already developed an approximate area of 10,442.0 hectares of Established Forest Tree Plantations and 830.0 hectares of established fruit trees, coffee trees and palm oil trees . While, a total of 12,038.0 hectares of degraded residual forest and 2,713.0 hectares of open/ brush land is subject for development into forest tree, fruit trees, oil palm and / or rubber trees plantations, while 213.0 hectares of cultivated/ Agroforestry area will be subjected to further development and management with appropriate agricultural species. The management has allocated 733.0 hectares of Resettlement area for the indigenous people (natives) staying in the area and majority of these natives are workers of the company.

Moreover, the project intends to harvest the matured planted trees within the said 10,442 hectares of established plantation which at present, has an approximate harvestable area of 1,812.0 hectares with equivalent volume of 470,066.0 cubic meters. While, a retrieve approximate area of 12,038.0 hectares Degraded Residual forest with an equivalent volume of 256,650.0 cubic meters will be harvested once the Executive Order No. 23 or Moratorium of conversion of degraded residual forest will be lifted.

The project intends to develop and convert the degraded residual forest and open/ brush land areas of the IFMA into integrated forest plantation using clearcutting and replanting method. Site preparation necessitates cutting of all vegetation 20 cm dbh and up. Plantation development activities like planting, thinning and harvesting shall commence once the area is all set. All development activities will be conducted safely and environmentally acceptable. Any potential impacts on the environment must be assessed and predicted in order to prevent or reduce the likelihood of such environmental risk incidents or impacts within the IFMA area.

## **1.1. Project Location and Area**

The Consolidated IFMA Project Area is located in Region XII (SOCCSKSARGEN) which is located in the heart of Mindanao (**Map 1-1**).



*Map*  
**1-1. Location of Region XII  
SOCCSKSARGEN**

The region is composed of four provinces, 5 cities, 45 municipalities, and 1,192 barangays. The project is located in the smallest province of the region, Sultan Kudarat (**Map 1-2**).



*Map 1-2. Location of Sultan Kudarat Province*



The MSCI consolidated IFMA project is composed of Five (5) Blocks with a total area of 29,085.0 hectares located in the Province of Sultan Kudarat, specifically within Barangay Pamantingan, Sabanal, Tinandok, Tulale, Margues, Magtongoc, Salansang, Masiag, and Coden, in the Municipalities of Esperanza, Lebak, Kalamansig, Se. N. Aquino and Bagumbayan, all in the Province of Sultan Kudarat in Region XII SOCCSKSARGEN. (Please see **Annex B: Location of Unconsolidated IFMA Areas**).

The IFMA area is geographically situated between 06° 23' 09" to 06° 43' 08" N latitude and 124° 25' 00" to 124° 31' 54" E longitude.

The Project Area is divided into five blocks to facilitate management. Location and area of the blocks are as follows:

*Table 1-1. Area and Location of Blocks*

Block No.	Municipality	Area (Has.)
Block I	Lebak	258
Block II	Esperanza, Lebak, Kalamansig, Bagumbayan	24,432
Block III	Kalamansig	3,844
Block IV	Sen. Ninoy Aquino	241
Block V	Bagumbayan	310
<b>Total</b>		<b>29,085</b>

**Table 1-2** below presents the geographic coordinates for each block:

*Table 1-2. Geographic Coordinates for each Block*

IFMA Block I		
Point	Longitude	Latitude
1	124° 12' 49" E	6° 38' 06" N
2	124° 13' 02" E	6° 38' 19" N
3	124° 13' 53" E	6° 38' 32" N
4	124° 14' 20" E	6° 38' 23" N
5	124° 14' 20" E	6° 38' 10" N
6	124° 14' 25" E	6° 38' 08" N
7	124° 14' 28" E	6° 37' 48" N
8	124° 14' 36" E	6° 37' 41" N
9	124° 14' 02" E	6° 37' 03" N
10	124° 14' 01" E	6° 37' 41" N
11	124° 13' 39" E	6° 37' 42" N
12	124° 13' 29" E	6° 37' 47" N
13	124° 13' 14" E	6° 37' 35" N
14	124° 12' 44" E	6° 37' 29" N
IFMA Block II		
Point	Longitude	Latitude
1	124° 21' 00" E	6° 40' 23" N
2	124° 21' 24" E	6° 41' 08" N
3	124° 20' 47" E	6° 43' 26" N
4	124° 19' 41" E	6° 43' 23" N

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5	124° 19' 36" E	6° 44' 14" N
6	124° 24' 8" E	6° 44' 13" N
7	124° 23' 22" E	6° 43' 01" N
8	124° 23' 7" E	6° 42' 59" N
9	124° 23' 31" E	6° 42' 10" N
10	124° 23' 34" E	6° 42' 28" N
11	124° 24' 18" E	6° 42' 26" N
12	124° 24' 47" E	6° 41' 47" N
13	124° 24' 55" E	6° 41' 18" N
14	124° 23' 29" E	6° 40' 43" N
15	124° 23' 37" E	6° 39' 50" N
16	124° 23' 40" E	6° 40' 05" N
17	124° 22' 45" E	6° 39' 52" N
18	124° 25' 27" E	6° 36' 32" N
19	124° 25' 48" E	6° 35' 38" N
20	124° 24' 37" E	6° 33' 37" N"
21	124° 25' 17" E	6° 31' 33" N
22	124° 24' 46" E	6° 31' 16" N
23	124° 24' 25" E	6° 31' 08" N
24	124° 22' 16" E	6° 32' 32" N
25	124° 19' 41" E	6° 31' 58" N
26	124° 19' 25" E	6° 32' 16" N
27	124° 19' 25" E	6° 32' 35" N
28	124° 19' 36" E	6° 32' 46" N
29	124° 19' 27" E	6° 33' 05" N
30	124° 18' 52" E	6° 33' 35" N
31	124° 18' 53" E	6° 33' 28" N
32	124° 18' 47" E	6° 33' 27" N
33	124° 18' 49" E	6° 33' 32" N
34	124° 18' 40" E	6° 33' 33" N
35	124° 18' 37" E	6° 33' 28" N
36	124° 18' 31" E	6° 33' 28" N
37	124° 18' 20" E	6° 33' 19" N
38	124° 18' 21" E	6° 33' 10" N
39	124° 18' 11" E	6° 33' 10" N
40	124° 17' 50" E	6° 32' 50" N
41	124° 17' 38" E	6° 34' 02" N
42	124° 17' 16" E	6° 34' 22" N
43	124° 15' 55" E	6° 33' 49" N
44	124° 15' 19" E	6° 32' 59" N
45	124° 14' 59" E	6° 32' 56" N
46	124° 14' 53" E	6° 32' 44" N
47	124° 15' 14" E	6° 32' 39" N
48	124° 14' 01" E	6° 31' 10" N
49	124° 14' 29" E	6° 31' 09" N
50	124° 14' 17" E	6° 30' 35" N
51	124° 13' 55" E	6° 30' 28" N
52	124° 13' 43" E	6° 30' 13" N
53	124° 13' 43" E	6° 29' 53" N
54	124° 13' 35" E	6° 29' 50" N
55	124° 13' 20" E	6° 30' 01" N
56	124° 13' 27" E	6° 30' 08" N
57	124° 13' 25" E	6° 30' 13" N
58	124° 13' 17" E	6° 30' 18" N
59	124° 13' 11" E	6° 30' 26" N
60	124° 12' 53" E	6° 30' 20" N
61	124° 13' 18" E	6° 32' 05" N

62	124° 13' 31" E	6° 32' 17" N
63	124° 13' 35" E	6° 32' 31" N
64	124° 13' 22" E	6° 32' 31" N
65	124° 13' 04" E	6° 32' 04" N
66	124° 10' 38" E	6° 33' 18" N
67	124° 10' 24" E	6° 34' 32" N
68	124° 10' 52" E	6° 34' 32" N
69	124° 10' 53" E	6° 34' 52" N
70	124° 10' 46" E	6° 35' 10" N
71	124° 10' 50" E	6° 35' 19" N
72	124° 11' 13" E	6° 35' 09" N
73	124° 11' 32" E	6° 35' 19" N
74	124° 11' 28" E	6° 35' 32" N
75	124° 11' 14" E	6° 35' 23" N
76	124° 11' 11" E	6° 35' 30" N
77	124° 11' 26" E	6° 35' 42" N
78	124° 11' 35" E	6° 35' 51" N
79	124° 12' 07" E	6° 35' 40" N
80	124° 12' 03" E	6° 34' 32" N
81	124° 13' 07" E	6° 34' 33" N
82	124° 15' 53" E	6° 36' 39" N
83	124° 18' 07" E	6° 38' 50" N
84	124° 18' 13" E	6° 38' 56" N
85	124° 19' 05" E	6° 38' 32" N
86	124° 19' 37" E	6° 40' 08" N
<b>Block III</b>		
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>
1	124° 6' 23" E	6° 24' 04" N
2	124° 5' 58" E	6° 24' 10" N
3	124° 6' 19" E	6° 24' 31" N
4	124° 6' 16" E	6° 24' 55" N
5	124° 5' 34" E	6° 24' 55" N
6	124° 5' 34" E	6° 25' 15" N
7	124° 5' 43" E	6° 25' 15" N
8	124° 5' 39" E	6° 25' 32" N
9	124° 5' 08" E	6° 25' 35" N
10	124° 4' 44" E	6° 25' 25" N
11	124° 4' 22" E	6° 25' 51" N
12	124° 5' 12" E	6° 26' 15" N
13	124° 5' 45" E	6° 27' 05" N
14	124° 5' 53" E	6° 27' 08" N
15	124° 6' 01" E	6° 26' 48" N
16	124° 5' 05" E	6° 26' 40" N
17	124° 6' 12" E	6° 26' 15" N
18	124° 6' 20" E	6° 26' 23" N
19	124° 6' 06" E	6° 26' 38" N
20	124° 6' 11" E	6° 26' 50" N
21	124° 6' 12" E	6° 27' 05" N
22	124° 6' 24" E	6° 27' 03" N
23	124° 6' 23" E	6° 26' 49" N
24	124° 6' 34" E	6° 26' 36" N
25	124° 6' 40" E	6° 26' 40" N
26	124° 6' 58" E	6° 26' 34" N
27	124° 6' 58" E	6° 26' 10" N
28	124° 7' 30" E	6° 26' 26" N
29	124° 7' 12" E	6° 26' 26" N
30	124° 7' 01" E	6° 27' 00" N

**ENVIRONMENTAL  
IMPACT ASSESSMENT  
REPORT**

**Forest Resource Utilization and Plantation Development Project**

Municipalities of Esperanza, Lebak, Kalamansig, Bagumbayan, and  
Senator Ninoy Aquino, All in the Province of Sultan Kudarat, Region XII

31	124° 6' 28" E	6° 27' 04" N
32	124° 6' 27" E	6° 27' 14" N
33	124° 6' 44" E	6° 27' 20" N
34	124° 6' 48" E	6° 27' 31" N
35	124° 6' 38" E	6° 27' 31" N
36	124° 6' 26" E	6° 27' 38" N
37	124° 6' 14" E	6° 27' 34" N
38	124° 6' 18" E	6° 27' 53" N
39	124° 6' 30" E	6° 28' 01" N
40	124° 6' 31" E	6° 28' 12" N
41	124° 7' 13" E	6° 28' 30" N
42	124° 7' 25" E	6° 28' 45" N
43	124° 7' 50" E	6° 28' 26" N
44	124° 8' 01" E	6° 28' 38" N
45	124° 8' 26" E	6° 28' 22" N
46	124° 8' 32" E	6° 28' 50" N
47	124° 8' 19" E	6° 28' 58" N
48	124° 8' 28" E	6° 29' 05" N
49	124° 8' 23" E	6° 29' 40" N
50	124° 8' 30" E	6° 29' 21" N
51	124° 8' 40" E	6° 29' 00" N
52	124° 8' 47" E	6° 27' 52" N
53	124° 8' 24" E	6° 28' 01" N
54	124° 8' 10" E	6° 28' 14" N
55	124° 8' 03" E	6° 28' 09" N
56	124° 8' 20" E	6° 27' 52" N
57	124° 8' 20" E	6° 27' 36" N
58	124° 8' 17" E	6° 27' 23" N
59	124° 8' 18" E	6° 27' 04" N
60	124° 8' 05" E	6° 26' 58" N
61	124° 8' 11" E	6° 26' 39" N
62	124° 8' 40" E	6° 26' 43" N
63	124° 8' 23" E	6° 25' 08" N
64	124° 8' 32" E	6° 24' 25" N
65	124° 8' 24" E	6° 24' 06" N
<b>Block IV</b>		
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>
1	124° 13' 53" E	6° 25' 26" N
2	124° 14' 15" E	6° 25' 41" N
3	124° 14' 30" E	6° 25' 22" N
4	124° 14' 41" E	6° 24' 19" N
5	124° 15' 09" E	6° 24' 14" N
6	124° 15' 28" E	6° 24' 22" N
7	124° 15' 09" E	6° 24' 15" N
8	124° 14' 41" E	6° 24' 19" N
9	124° 15' 09" E	6° 24' 14" N
10	124° 15' 28" E	6° 24' 22" N
11	124° 15' 09" E	6° 24' 33" N
12	124° 15' 20" E	6° 24' 38" N
13	124° 15' 17" E	6° 24' 51" N
14	124° 15' 46" E	6° 25' 13" N
15	124° 16' 35" E	6° 24' 44" N
16	124° 16' 35" E	6° 23' 54" N
17	124° 16' 20" E	6° 23' 48" N
18	124° 16' 11" E	6° 23' 40" N
19	124° 16' 04" E	6° 23' 45" N
20	124° 15' 38" E	6° 23' 26" N

21	124° 15' 21" E	6° 23' 34" N
22	124° 14' 53" E	6° 23' 33" N
23	124° 14' 43" E	6° 23' 42" N
24	124° 14' 55" E	6° 24' 00" N
25	124° 14' 14" E	6° 23' 59" N
26	124° 14' 01" E	6° 24' 20" N
27	124° 14' 19" E	6° 24' 50" N
28	124° 14' 20" E	6° 25' 07" N
29	124° 14' 05" E	6° 25' 12" N
<b>Block V</b>		
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>
1	124° 32' 13.85" E	6° 23' 25.52" N
2	124° 32' 14.59" E	6° 23' 21.61" N
3	124° 32' 12.47" E	6° 23' 22.40" N
4	124° 32' 8.63" E	6° 23' 21.57" N
5	124° 32' 8.17" E	6° 23' 20.23" N
6	124° 32' 8.24" E	6° 23' 19.39" N
7	124° 32' 7.58" E	6° 23' 17.31" N
8	124° 32' 6.41" E	6° 23' 16.82" N
9	124° 32' 5.53" E	6° 23' 17.83" N
10	124° 32' 3.61" E	6° 23' 17.71" N
11	124° 31' 58.88" E	6° 23' 13.98" N
12	124° 31' 56.21" E	6° 23' 13.69" N
13	124° 31' 53.41" E	6° 23' 13.08" N
14	124° 31' 52.39" E	6° 23' 10.09" N
15	124° 31' 45.83" E	6° 23' 2.75" N
16	124° 31' 43.65" E	6° 23' 1.69" N
17	124° 31' 40.86" E	6° 22' 56.19" N
18	124° 31' 42.26" E	6° 22' 54.66" N
19	124° 31' 33.67" E	6° 22' 43.71" N
20	124° 31' 31.35" E	6° 22' 41.77" N
21	124° 31' 30.50" E	6° 22' 39.33" N
22	124° 31' 33.36" E	6° 22' 38.63" N
23	124° 31' 37.18" E	6° 22' 30.39" N
24	124° 31' 38.05" E	6° 22' 27.26" N
25	124° 31' 41.27" E	6° 22' 29.76" N
26	124° 31' 42.51" E	6° 22' 28.61" N
27	124° 31' 45.20" E	6° 22' 27.50" N
28	124° 31' 44.29" E	6° 22' 25.68" N
29	124° 31' 45.94" E	6° 22' 22.12" N
30	124° 31' 45.27" E	6° 22' 17.83" N
31	124° 31' 43.09" E	6° 22' 15.30" N
32	124° 31' 39.71" E	6° 22' 8.34" N
33	124° 31' 35.05" E	6° 22' 3.18" N
34	124° 31' 46.49" E	6° 21' 59.95" N
35	124° 31' 43.59" E	6° 21' 57.36" N
36	124° 31' 45.27" E	6° 21' 55.56" N
37	124° 31' 47.56" E	6° 21' 59.07" N
38	124° 31' 48.95" E	6° 21' 56.36" N
39	124° 31' 48.45" E	6° 21' 52.88" N
40	124° 31' 44.51" E	6° 21' 52.08" N
41	124° 31' 21.13" E	6° 21' 33.33" N
42	124° 31' 19.50" E	6° 21' 33.89" N

43	124° 31' 6.62" E	6° 21' 24.00" N
44	124° 31' 4.64" E	6° 21' 24.30" N
45	124° 31' 4.67" E	6° 21' 25.89" N
46	124° 31' 1.33" E	6° 21' 28.41" N
47	124° 31' 1.34" E	6° 21' 32.54" N
48	124° 31' 0.66" E	6° 21' 32.64" N
49	124° 31' 0.37" E	6° 21' 34.60" N
50	124° 31' 8.59" E	6° 21' 39.56" N
51	124° 31' 7.00" E	6° 21' 41.68" N
52	124° 31' 5.11" E	6° 21' 41.68" N
53	124° 31' 0.01" E	6° 21' 43.62" N
54	124° 30' 54.10" E	6° 21' 38.75" N
55	124° 30' 52.35" E	6° 21' 39.31" N
56	124° 30' 53.33" E	6° 21' 39.93" N
57	124° 30' 53.66" E	6° 21' 42.07" N
58	124° 30' 52.10" E	6° 21' 44.45" N
59	124° 30' 52.69" E	6° 21' 46.15" N
60	124° 30' 52.99" E	6° 21' 48.00" N
61	124° 30' 55.04" E	6° 21' 46.63" N
62	124° 30' 55.82" E	6° 21' 48.12" N
63	124° 30' 55.34" E	6° 21' 48.91" N
64	124° 30' 57.72" E	6° 21' 50.56" N
65	124° 30' 59.37" E	6° 21' 49.77" N
66	124° 30' 59.83" E	6° 21' 48.66" N
67	124° 30' 58.75" E	6° 21' 47.33" N
68	124° 30' 57.35" E	6° 21' 46.72" N
69	124° 30' 58.06" E	6° 21' 45.15" N
70	124° 30' 59.75" E	6° 21' 44.17" N
71	124° 31' 1.93" E	6° 21' 44.65" N
72	124° 31' 6.20" E	6° 21' 47.86" N
73	124° 31' 9.32" E	6° 21' 47.37" N
74	124° 31' 12.26" E	6° 21' 49.18" N
75	124° 31' 17.86" E	6° 21' 52.00" N
76	124° 31' 18.27" E	6° 21' 58.18" N
77	124° 31' 18.86" E	6° 21' 58.93" N
78	124° 31' 17.96" E	6° 22' 4.24" N
79	124° 31' 15.86" E	6° 22' 8.90" N
80	124° 31' 16.49" E	6° 22' 10.65" N
81	124° 31' 20.21" E	6° 22' 13.80" N
82	124° 31' 29.06" E	6° 22' 16.54" N
83	124° 31' 30.66" E	6° 22' 17.64" N
84	124° 31' 27.25" E	6° 22' 18.79" N
85	124° 31' 24.62" E	6° 22' 19.94" N
86	124° 31' 22.89" E	6° 22' 19.04" N
87	124° 31' 16.88" E	6° 22' 21.46" N
88	124° 31' 12.80" E	6° 22' 20.14" N
89	124° 31' 11.51" E	6° 22' 21.87" N
90	124° 31' 7.60" E	6° 22' 20.51" N
91	124° 31' 7.16" E	6° 22' 24.45" N
92	124° 31' 5.05" E	6° 22' 26.71" N
93	124° 31' 1.92" E	6° 22' 26.75" N
94	124° 30' 53.29" E	6° 22' 22.64" N
95	124° 30' 55.87" E	6° 22' 27.19" N

96	124° 30' 53.07" E	6° 22' 36.44" N
97	124° 30' 50.37" E	6° 22' 36.91" N
98	124° 30' 49.66" E	6° 22' 27.11" N
99	124° 30' 44.03" E	6° 22' 28.69" N
100	124° 30' 44.18" E	6° 22' 34.29" N
101	124° 30' 37.96" E	6° 22' 34.04" N
102	124° 30' 33.98" E	6° 22' 30.74" N
103	124° 30' 24.98" E	6° 22' 35.71" N
104	124° 30' 27.73" E	6° 22' 41.30" N
105	124° 30' 27.45" E	6° 22' 44.92" N
106	124° 30' 28.76" E	6° 22' 48.17" N
107	124° 30' 34.62" E	6° 22' 47.96" N
108	124° 30' 37.75" E	6° 22' 51.96" N
109	124° 30' 44.48" E	6° 22' 58.44" N
110	124° 30' 53.25" E	6° 22' 55.36" N
111	124° 31' 0.07" E	6° 23' 2.11" N
112	124° 30' 58.00" E	6° 23' 6.15" N
113	124° 30' 59.37" E	6° 23' 6.18" N
114	124° 31' 3.75" E	6° 23' 0.83" N
115	124° 31' 4.85" E	6° 22' 57.70" N
116	124° 31' 8.92" E	6° 22' 58.57" N
117	124° 31' 7.92" E	6° 23' 2.57" N
118	124° 31' 11.29" E	6° 23' 9.04" N
119	124° 31' 12.79" E	6° 23' 10.11" N
120	124° 31' 14.57" E	6° 23' 8.41" N
121	124° 31' 17.58" E	6° 23' 12.73" N
122	124° 31' 18.87" E	6° 23' 8.99" N
123	124° 31' 20.99" E	6° 23' 9.40" N
124	124° 31' 21.89" E	6° 23' 5.56" N
125	124° 31' 22.87" E	6° 22' 55.66" N
126	124° 31' 32.81" E	6° 22' 59.99" N
127	124° 31' 36.92" E	6° 23' 5.38" N
128	124° 31' 44.83" E	6° 23' 4.22" N
129	124° 31' 49.42" E	6° 23' 7.53" N
130	124° 31' 50.06" E	6° 23' 15.18" N
131	124° 31' 54.89" E	6° 23' 19.04" N
132	124° 31' 55.77" E	6° 23' 17.76" N
133	124° 32' 5.15" E	6° 23' 20.41" N
134	124° 32' 5.17" E	6° 23' 26.53" N
135	124° 32' 10.30" E	6° 23' 33.97" N

### **1.1.1. Accessibility**

The IFMA project area is approximately 60 km northwest of Koronadal City, South Cotabato Province, the administrative center of Region XII and 115 km northwest of the highly-urbanized General Santos City, the regional center for trade and commerce. About 58 km northwest is the independent city, Cotabato City while Kidapawan, capital of Cotabato Province is 90 km southeast of the project area. Tacurong City, a component city of Sultan Kudarat is 40 km east of the proposed IFMA while the town of Isulan, provincial capital of Sultan Kudarat is about 33 km southeast.

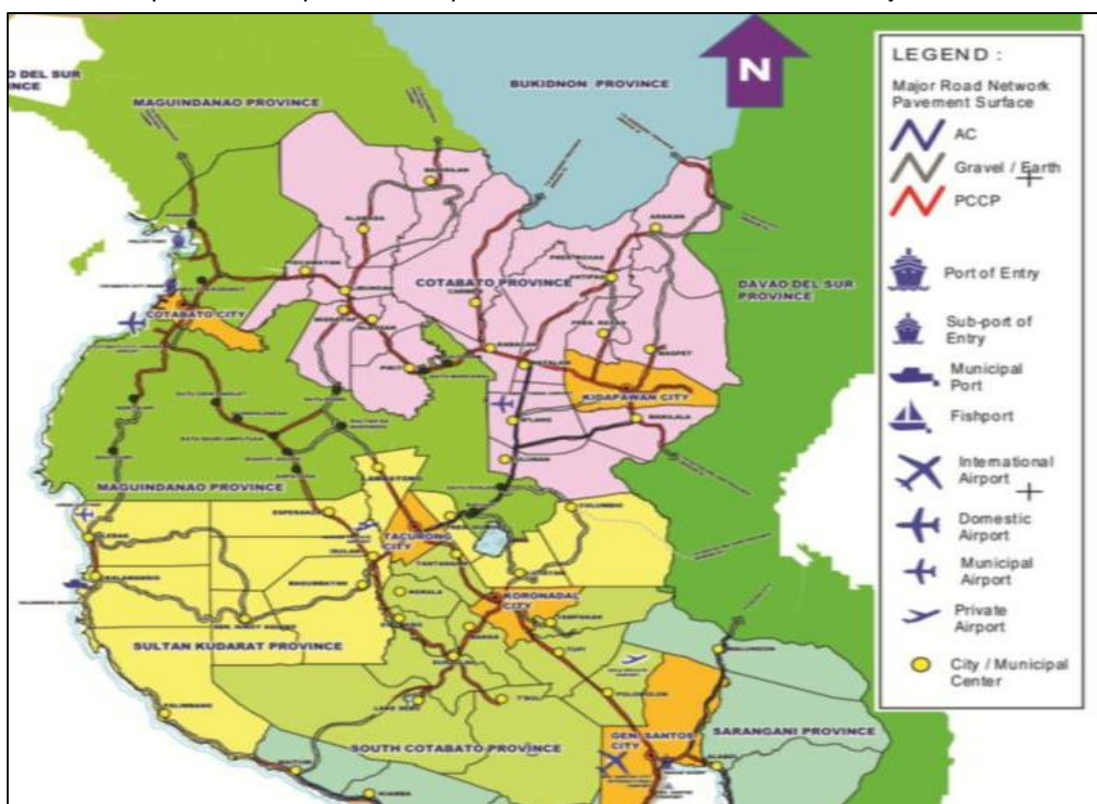
The nearest domestic airports are in Cotabato City and General Santos City. From Cotabato City, the Consolidated IFMA project area may be accessed via the concrete-paved Marbel-Allah Valley-Cotabato Road which passes through the Maguindanao Province then onwards to Esperanza and

Isulan in Sultan Kudarat Province. The section of the road from Esperanza to Isulan is mostly asphalt-paved.

From Isulan, a secondary road – Junction Isulan-Ninoy Aquino Road – passes through the municipality of Bagumbayan towards the Municipality of Senator Ninoy Aquino. This road is paved with concrete although there are some parts that are gravel. This road connects to another secondary road, the SNA-Kalamansig-Lebak Road. The road surface in the section from SNA to Kalamansig is gravel. There are municipal and barangay roads – mostly unpaved or with gravel - connected to these two secondary national roads which lead to areas of the Consolidated IFMA.

There are also two existing seaports in the province that are near the concrete-paved Awang-Upi-Lebak-Kalamansig-Palimbang-Sarangani Road which connects to the SNA-Kalamansig-Lebak Road and could facilitate travel to the Consolidated IFMA Project Area. The seaports are the Port of Lebak in Poblacion, Kalamansig and San Roque Port in Palimbang. **(Map 1-3).**

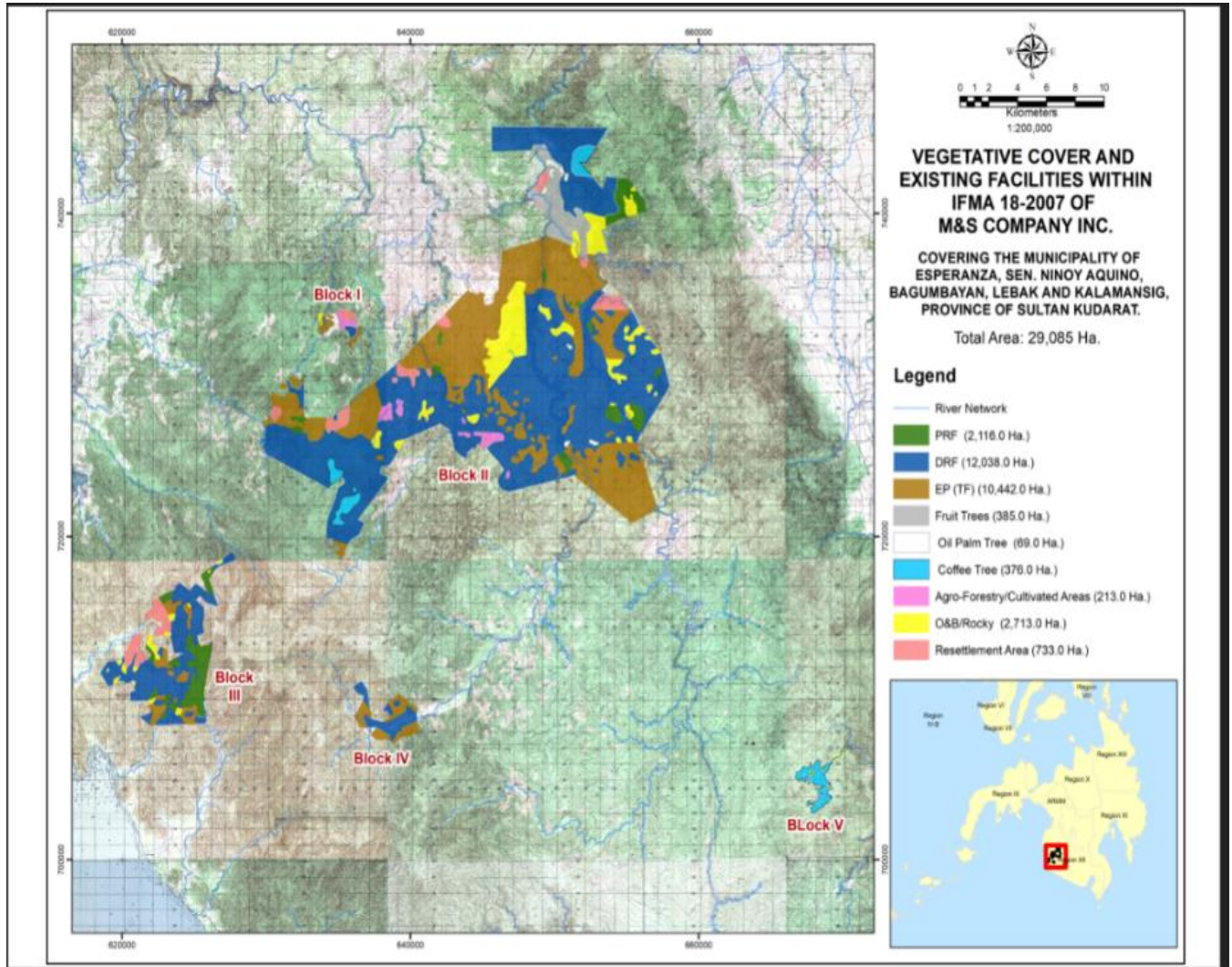
*Map 1-3. Transportation Map, Province of Sultan Kudarat and Adjacent Areas*





### **1.1.2. Impact Areas**

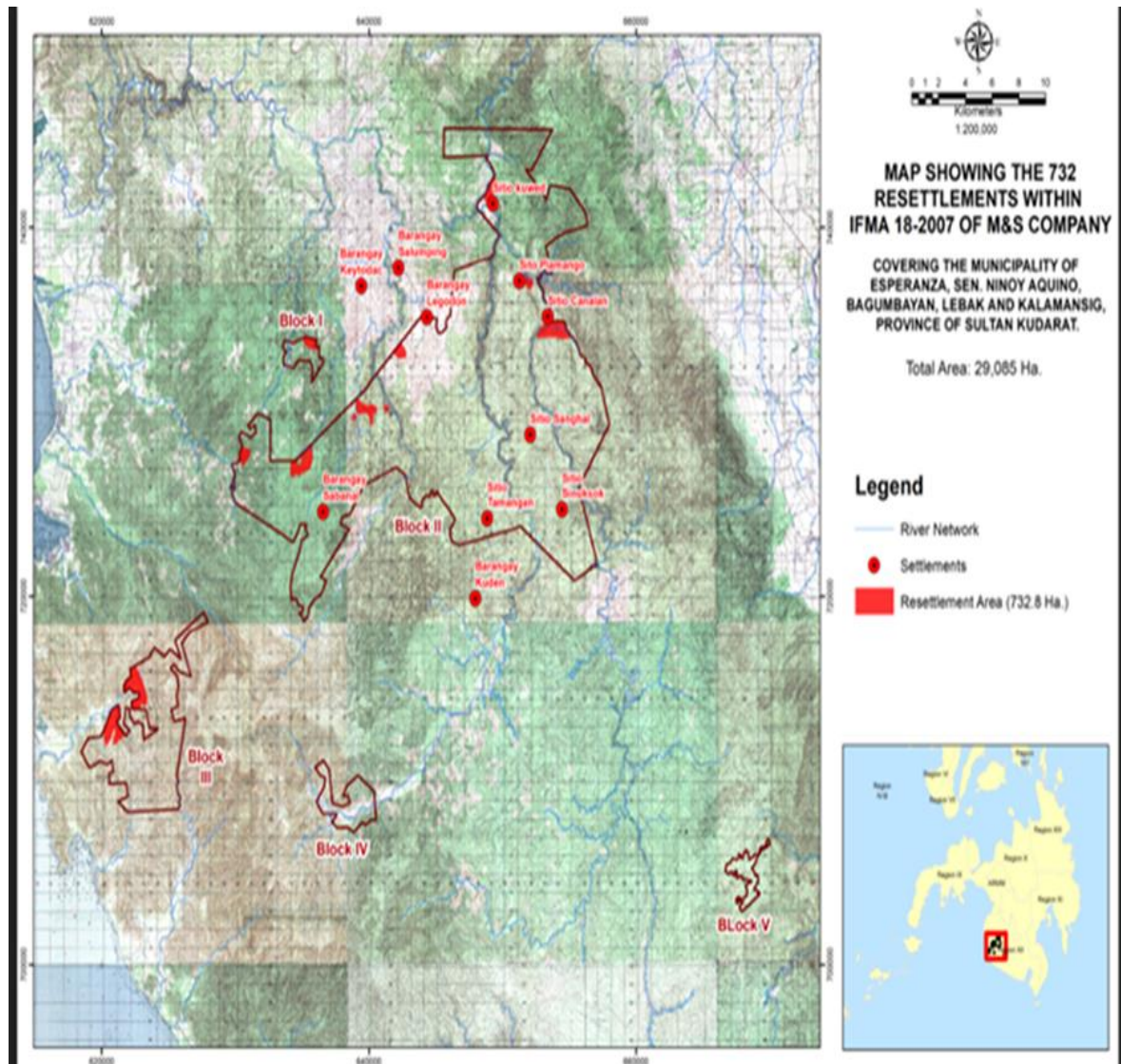
In the planting, harvesting, and maintenance operations and other related activities, the project area to be affected is the 29,085 -hectare of IFMA project site with below map showing the PRF, DRF, EP, O/B, Cultivated and Resettlement areas.



The direct impact area in terms of employment and other socio-economic impacts are the communities within the IFMA area esp. those informal settlers, mostly the IP's being manage-in placed in the allocated resettlements area of 733 hectares. They were provided with farm animals, planting materials, farm – implements and housing provision. Furthermore, they were technically assisted primarily on sustainable farming. The hauling route is considered also an direct impact zone primarily because of dust and noise generation. Shown below the resettlement areas within IFMA area. while the secondary impact areas are those communities adjacent and outside the IFMA service area.

Other Impacts considered in the delineation of the direct impact zones are generation of logging waste and residues, removal of vegetation, displacement of terrestrial fauna, deterioration of surface and groundwater water quality and supply, increased amount of NO<sub>x</sub> and SO<sub>x</sub> at the IFMA area and hauling routes, and noise generation. (**Map 1-4**).

*Map 1-4. Impact Areas of the Project of IFMA No. 18-2007*



The indirect impact areas include the nearby hills and mountains and the downstream segment of rivers and creeks. These are possible receptors of dust, noise, and pollution from solid waste.

## **1.2. Project Rationale**

M & S Company, Inc. is the holder of an Integrated Forest Management Agreement (IFMA) No. 18-2007.

An Integrated Forest Management Agreement is a production sharing contract entered into by and between the DENR and a qualified applicant wherein the DENR grants to the latter the exclusive right to develop, manage, protect and utilize a specified area of forestland and forest resources therein for a period of 25 years and may be renewed for another 25-year period, consistent with the principle of sustainable development and in accordance with an approved Comprehensive Development and Management Plan (CDMP) and under which both parties share in its produce. (DENR Administrative Order No. 99-53).

The overall objective of this consolidated project is for the company to continuously develop, improve, protect and manage the whole area of 29,085.0 hectares under IFMA No. 18-2007 into a sustainable and productive combination of the natural and plantation forests that will support the requirements for timber and non-timber forest products supply for its affiliated wood processing plant and the local market; and attain ecological balance and efficiently functioning ecosystem by means of sustainable management

Moreover, for the area to be effectively developed and managed, explicit plan objectives are listed below, to wit:

- a. Management, protection and maintenance of the already established tree plantation with an estimated area of 10,442 hectares and 1,043 under previously granted IFMA's and which are now part of the present IFMA No. 18-2007;
- b. Development of 9,823 hectares out of the 12,038 hectare degraded residual forest into forest tree plantation of mixed species within a period of five (5) years;
- c. Development of the 2,713 hectares of open/brush land areas into industrial tree plantation using various species including coffee and oil palm;
- d. Management and maintenance of the remaining 2,215 hectares of degraded residual forest as protection forest through enrichment planting using rattan, bamboo and other indigenous species.
- e. Management of the Production Residual Forest covering 2,116 hectares following the Selective Logging System (SLS) consistent with the provisions of E.O 23 and other existing relevant laws, rules and regulations.
- f. To improve the economic well-being of upland people and community's dependent on forest resources thru provision of employment opportunities and livelihood/income generating activities to qualified residents within and nearby communities.
- g. Protection of the entire IFMA area from forest destruction, such as slash and burn agriculture; illegal entry/forest intruders; forest fires, pests and diseases thru hiring of forest guards and regular conduct of foot patrol and aerial surveillance using Cessna plane.

- h. Preservation, protection and maintenance of biodiversity with the whole IFMA area so that it can become a continuing habitat of the different flora and fauna that are found therein;
- i. Development/installation of the needed processing plant necessary to cater the production for rubber, palm oil, coffee and other products within the IFMA area, as part of the company's plan under the Research and development Program.

The development of plantation forests is envisioned to rehabilitate and restore degraded forestland as well as ensure an adequate and steady supply of timber for the wood industry sector.

Moreover, planting and harvesting trees using sustainable practices will address the scarcity of raw materials in the wood industry in the Philippines. Such scarcity is manifested by the over-all increasing trend of imports of wood materials as gleaned from the Philippine Forestry Statistics 2014-2016.

M&S Company, Inc. further aims to enhance, rehabilitate and improve the degraded residual forest areas into a productive state through plantation development. High value trees with guaranteed return of investment such as fast growing Forest species, Rubber, Oil Palm, Coffee and Durian and high value fruit trees will be planted.

M&S Company Inc. recognizes the business potentials of offering product and by-products such as core and green veneer, lumber from center logs and fuel from log ends, veneer trimmings and saw dust from planted species such as *Acacia mangium*, *Gmelina arborea*, Bagras and other suitable species. Thus, the proponent likewise intends to transport these materials to its Recodo Wood Processing Plant in Zamboanga City. This facility aims to optimize utilization of fresh cut logs input and achieve higher wood recovery of 80 % with high quality grade of veneers. Another objective is to maximize the use of rejected logs by cutting them into different sizes of sliced lumber.

In addition, the company provides assistance to the government's poverty alleviation program by improving the lives of residents of host and adjacent barangays through provision of employment opportunities, livelihood assistance, and other social development programs and projects.

### **1.3. No Project Alternatives**

Under the No-Project Alternative, the IFMA Project and all associated infrastructure, water supply and pipeline, and access road improvements, would not be constructed. The no action alternative assumes that the IFMA areas would remain as areas of brushland, agro-forestry, and degraded residual forests and no reforestation and plantation forest establishment would be implemented. Use of the roads by the public on the site would continue. Under this alternative, neither the impacts nor benefits of the project would occur. However, the No-Project Alternative will leave the area open to access by people near the project area. This will result in the expansion of kaingin and the destruction of the existing second growth forest and its conversion to extensive grassland. The second growth forest will also be subjected to illegal logging and will also result to the denudation of the forest and its eventual conversion to non-productive grassland. There will be a breakdown of the environment in the area resulting in extensive erosion and the siltation of freshwater bodies.

In addition, the increases in revenues that the proposed IFMA generates for the national wealth and local government units and the spin-off industries in the affected municipalities benefiting from the operation will no longer be available.



## **1.4. Project Components**

The major components of the proposed IFMA Project are:

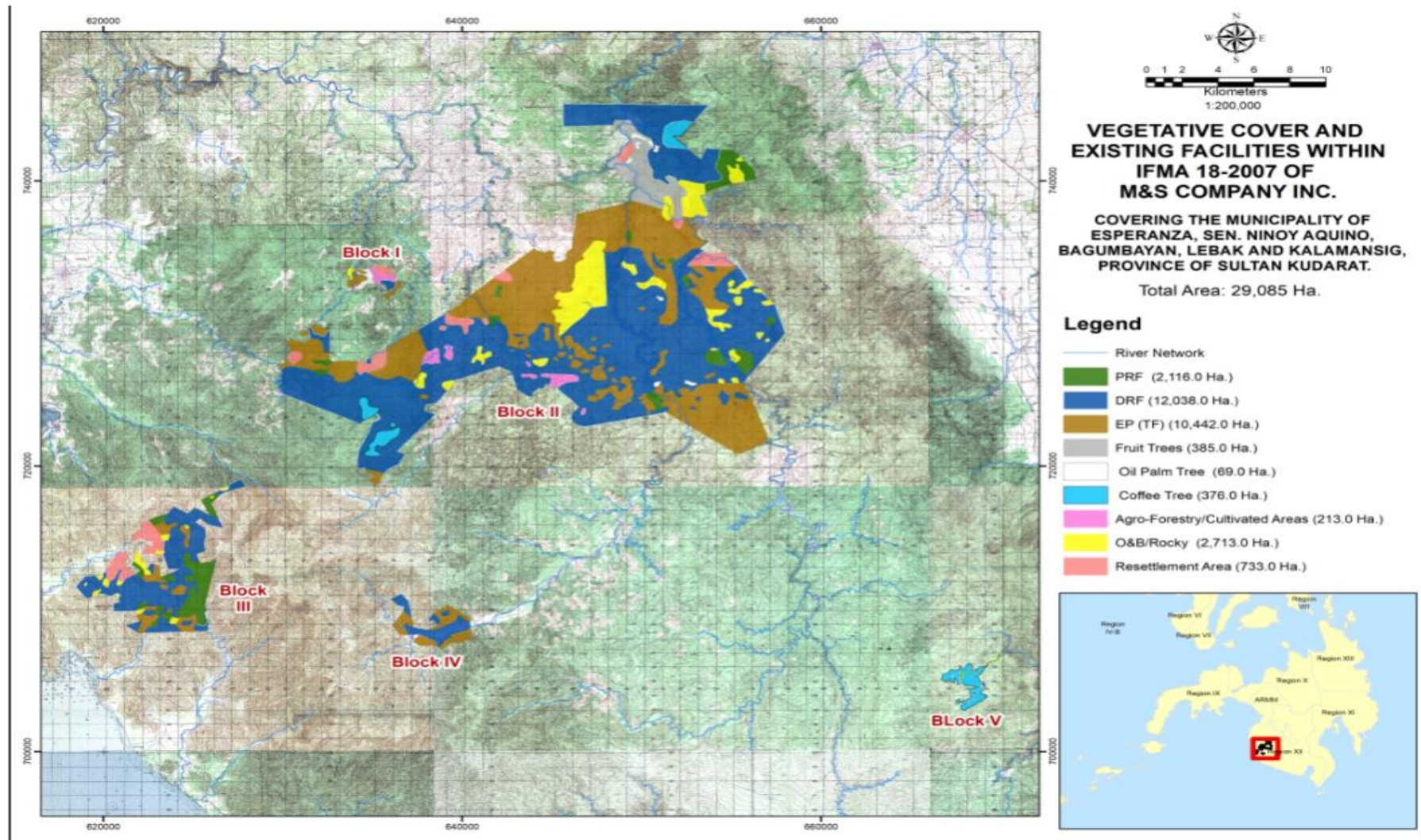
- a. Harvesting activities
- b. Plantation Development

### ***1.4.1. Area Allocation and Description***

The IFMA No. 18-2007 of MSCI comprises an aggregate area of 29,085.0 hectares. It is composed of Production Residual Forest, Degraded Residual Forest, Established Plantations, Open /Brush lands, Cultivated /Agroforestry Areas and Resettlement Area.

<b>Vegetative Cover</b>	<b>Present Area (in hectares)</b>
Production Residual Forest	2,116
Degraded Residual Forest	12,038
Established Tree Plantation	10,442
Agro-forestry/Cultivated Areas	1,043
Open land/brush land	2,713
Resettlement Area	733
<b>Total</b>	<b>29,085.00</b>

Map 1 5. Location of Major Components of Proposed IFMA



There are existing roads and bridges leading to most of the areas of operation with the IFMA area. These will be rehabilitated and maintained to ensure optimum service. **Map 1-6** shows the location of existing roads within the proposed IFMA area.

Proposed roads will be constructed as necessary. The logging roads to be constructed shall adhere to the provisions of PD 705, Revised Forestry Code, vis: Roads and other infrastructure in forest lands shall be constructed with the least impairment to the resource values thereof. (Sec. 40). Such roads shall be strategically located and their widths regulated so as to minimize clear-cutting, unnecessary damage or injury to healthy residuals, and erosion. Their construction must not only serve the transportation need of the logger but, most importantly, the requirement to save as many healthy residuals as possible during cutting and hauling operations. (Sec. 50). Roads shall adhere to the following minimum standards:

- Road reserve/tree clearance width - minimum of 15 meters
- Carriageway – Minimum width of 3.4 meters
- Road gradient – Minimum of 1%, maximum of 10% for straight sections; maximum of 8.3% for curved sections
- Road surface - gravel
- Roadside drains - At formation edge. 300 mm to 400 mm deep

*Map 1-5. Location of Existing Roads in Proposed IFMA Project Area and  
Adjacent Areas*



### ***1.4.2. Support Facilities and Infrastructure***

MSCI has established its camp in Sitio Plamango, Pamantingan, Esperanza and Salumping, Lebak, Sultan Kudarat. The company has already constructed the needed headquarters in the area, which is properly equipped with office building facilities, motor-pool, central nursery, staffhouse, guest house, bunkhouses, commissary building, warehouse, patrol tower, communication facilities, generator sets and others. These are the support facilities of the IFMA project.

A sum of 161.0 kilometers logging road is being maintained by the company. 143.0 kilometers of which are main roads and 18.0 kilometers are spur roads.

In anticipation of the positive and sustainable development of the IFMA area, the management has to program the implementation of various infrastructures that would create employment opportunities for the local residents, thereby increasing economic growth of the area. These infrastructures include but not limited to the following:

1. Integrated Processing Plants for wood (lumber, veneer and plywood), palm oil, rubber, coffee and durian.
2. Development of hydro-power plants under the renewable energy program of the government.
3. Construction of Airport Facilities such as airstrips and buildings.

### ***1.4.3. Pollution Control and Waste Management***

#### ***1.4.3.1. Wastewater Generation***

Domestic wastewater refers mainly to effluents from human activities which are associated with household activities. It is a complex mixture containing primarily water together with organic and inorganic constituents and contaminants which come from the excreta, urine, food wastes, and wastewater from bathing, washing, and laundering. Toilets with septic tanks are already installed at IFMA headquarters.

#### ***1.4.3.2. Waste Materials***

Logging residues such as branches, leaves, bark, etc. are traditionally left at the site in forests and are of prime importance for the restitution of minerals to the soil. A waste reduction method for logging residues at the harvesting area will be to allow the people in the community to collect twigs and branches for use as firewood.

The waste streams generated from log cutting (log ends, saw dust, trimmings) will be collected, crated, hauled and shipped to the Recodo WPP for use as fuel in boiler operations.

#### ***1.4.3.3. Solid and liquid waste***

Solid wastes are also generated at the IFMA headquarters. These include paper, bottles, cans, plastic containers, and other classified as domestic solid waste, and non-hazardous wastes such as scrap iron, used tires and glass.

Used oils (hydraulic and engine oil), soiled equipment (hoses, oil filters, oily rags, etc.), busted fluorescent lamps, used lead-acid batteries, and empty aerosol paint cans used to mark cuts or timber form the bulk of hazardous waste in IFMA operations.

Aside from waste minimization, collection points shall also be installed in strategic areas at the IFMA headquarters. The collection points are designed in such a manner that they encourage waste separation, segregation and recycling.

M&S Company will establish a waste and material recovery facility to collect and facilitate storage of segregated domestic/non-hazardous wastes.

Hazardous wastes will be stored in temporary storage areas until they reach sufficient volume to be collected by licensed hazardous waste transporters. The hazardous wastes will be stored in containers, properly labeled and stored per prescribed standards for such wastes.

## **1.5. Process/Technology**

### ***1.5.1. Nursery management***

Basic nursery operations are employed in raising the seedling requirements of the project. Improved technologies are adopted to ensure good quality plantations. The seeds are sourced from certified seed suppliers/collectors. Propagation of planting stocks involve preparation of germinating medium, sowing procedures, pricking and transplanting, seedling care and maintenance, seedlings hardening, grading and dispatching.

When the seedlings are ready for transplanting from the seedbed to the potting medium, watering, fungi control, application of fertilizer, shaking, root pruning, and hardening for acclimatizing shall also be performed.

### ***1.5.2. Plantation development***

Plantation development is preferred and deemed appropriate to develop the degraded and open areas of the proposed IFMA into a productive and sustainable state.

#### **1.5.2.1. Site Preparation**

Basically, site preparation in the open/ brush land includes cutting and removing all vegetation not higher the 20 cm from the ground level while vines will be uprooted. For ecological and economic purposes, all wood and woody materials, if any, will be collected for potential utilization. Stakes will be shoved as markers for planting at specified spacing and circle weeding will be done around the stake.

In the identified plantation sites in degraded residual forest, all trees (except indigenous species) regardless of diameter shall be clear-felled and utilized. Staking at relatively open areas will be along rows at spacing of 2m x 3m with the larger width opposite the east-west direction. It will be conducted during the first and second quarters of each year.

#### **1.5.2.2. Planting**

Every planting spot will be ring-weeded at 1meter diameter. Planting shall be conducted by setting the seedling correctly at the base of the hole. Planting operations will begin at least a week from the expected beginning of the rainy season to provide the seedlings a good start.

Initial plantation establishment in the proposed IFMA will be conducted during the next 5 years.

#### **1.5.2.3. Replanting, Weeding, Fertilization**

Replacement of dead seedlings will be conducted to have high survival rates. Dead seedlings will be identified by placing a stake on the ground. A planting crew will be assigned to replace the dead seedlings.

Preliminary weeding will be conducted roughly a month and a half after the first planting activity. This will be done to eradicate shrubs and climbers that may compete for space, nutrients and moisture with the planted seedlings. Supplementary fertilization will be concentrated in poorly growing seedlings. Organic or bio-fertilizer is the preferred alternative to correct nutrient deficiencies.

#### 1.5.2.4. Pruning and Thinning

Every tree will be pruned up to about 2 meters more or less from the ground level at age 18 months. Second and final pruning will be done on ages 3 and 5, respectively.

There will be two rounds of thinning before final harvest. The first round will be conducted at the end of the fourth year and the second round will be conducted at the end of the eighth year.

#### 1.5.2.5. Plantation Protection

M&S Company employs deputized security forest guards to protect and guard the entire Consolidated IFMA Project Area from destruction as well as prevent poaching and encroachment. A sustained information, education and communication campaign is conducted for forest occupants and surrounding communities on the importance of the project and how they will be benefited with its implementation. Forest guards and workers shall also be organized and trained as firefighting crew. They will be provided with appropriate firefighting tools, equipment and communication facilities in order to be able to give fast and aggressive response to prevent the spread and ultimately, contain the fire. Moreover, firebreaks and/or fire lines will also be established within plantation areas to serve as buffer zones in case of forest or grass fires. Both sides of the firebreaks/fire lines will be planted with secondary species to forestall the spread of forest fire should there be any.

Preventive measures are also implemented to protect the plantations from pests and diseases outbreak. This includes maintaining and tending operations that enhance growth of trees to make them resistant from the attack of pests and diseases. Biological and mechanical controls are preferred. Chemical/fungicide and insecticide spray may be applied only when necessary.

People in the IFMA communities will be oriented on the common signs of pest and diseases through billboards and meetings. Their heightened awareness is aimed at their being on the look-out year round for any sign of pests and diseases. If observed, this must be immediately reported to the M&S Company so appropriate actions can be implemented. This includes consulting expert pathologists or entomologists.

### **1.5.3. Harvesting**

M&S Company will use appropriate felling and bucking techniques such as directional felling, cutting stumps low to the ground to avoid waste, and the optimal crosscutting of tree stems into logs in ways that maximize the recovery of useful wood. These techniques aim to minimize environmental impacts on forest stands and soils.

The tree marking and cutting prescription for the species group will be consistent to the existing forestry regulations. In marking trees to be cut, the direction of fall shall be indicated to avoid unnecessary damage to residual trees to be left. Care in felling including extraction operation shall be observed to minimize damage to wildlings and saplings that make up the regeneration, including rattan, palms, and other species with economic value.

Different harvesting methods are applied on different sites to help ensure the forest regrows successfully and ecosystem connectivity is maintained while also allowing for the most effective recovery of wood for processing into wood products. The most appropriate timber harvesting method is chosen based on such factors as the forest type, soil, stakeholder feedback and presence of environmental values.

#### 1.5.3.1. Methods

##### *A. Clear-cutting of timber species*

For established forest tree plantations, clear-cutting method will be used. This method of harvesting removes the majority of the matured trees at the site all at the same time to access the available timber. In this method, trees in certain areas will not be cut to protect rivers and streams and provide wildlife habitat.

Clear-cutting is also preferred for sites in degraded residual forest areas identified for site preparation and development as forest tree plantations. Subject to the conduct of tree inventory prior to site preparation, naturally

grown trees shall be cut and utilized following the implementing guidelines of E.O. 23. Naturally growing indigenous species, whenever present, are left as future mother trees.

This method produces an even-staged stand by completely removing the mature stand. Clearcutting also has several advantages:

- a. Delay in restocking the site is avoided;
- b. Selected species, seed source, and genotype can be introduced;
- c. Arrangement and spacing can be controlled;
- d. Uniformity in the proposed stand can be achieved;
- e. Some pests that require forest cover can be eliminated; and
- f. Problems associated with securing sufficient natural regeneration can be overcome.

All clear-cutting operations will be followed by site preparation / plantation development.

### *B. Selective logging of timber species*

In Productive Residual Forests (PRF), a selective logging method will be employed subject to the lifting of the moratorium on tree cutting per EO 23. In this method, only commercially valuable trees larger than 50 cm dbh within the 2,115.70 hectare-PRF will be harvested following the stipulated rules and regulations stated in DAO 99-53 and other existing forestry rules and regulations.

In this method, mature (> 50 cm dbh), over mature and defective trees are systematically removed of in such a manner as to leave uninjured an adequate number and volume of healthy residual trees of the commercial species and other trees necessary to assure a future crop of timber and forest cover for the protection and conservation of soil and water. An adequate stand is composed of uninjured seedling and saplings (< 20 cm dbh) and young trees (20 – 50 cm dbh) left as a result of exercising care by using suitable techniques and equipment.

With selective logging, the remaining vegetation recognizably constitutes a forest. It is expected that after selective logging, sufficient forest cover will remain to protect and conserve water, soil and biodiversity.

### *C. Thinning of timber species*

In degraded residual forests, silvicultural treatments such as pre-commercial thinning and commercial thinning may be undertaken on the 4th year and 8th year, respectively, and final harvest on the 12th year or earlier which will be followed by immediate replanting of the area harvested.

Pre-commercial thinning is a thinning method performed prior to trees reaching merchantable size, typically around 10-12 cm dbh. The objective is to release some trees in overstocked stands by reducing densities to prevent stagnation and increase the growth of the remaining trees.

When implemented properly and in a timely fashion, pre-commercial thinning increases diameter growth of residual trees and increases in tree diameter correlates to increases in tree volume. Additionally, pre-commercial thinning prevents the stand from stagnating, which could eventually lead to excessive tree mortality, increase the potential for pest invasions, or extend the rotation length (period of time it takes for trees to reach financial maturity). Additionally, pre-commercial thinning allows for desirable herbaceous vegetation to grow as more sunlight light reaches the forest floor.

Similar to pre-commercial thinning, commercial thinning is done improve timber quality and stand growth but at a later stage of the tree's growth. Commercial thinning influences spatial and temporal forest cover diversity. As with wood supply, other resources can benefit from a suitable mix of attributes within the forest. Wildlife requires a mixture of habitats, including early and late seral stages. Thinning can play a role in accelerating the development of some old growth characteristics in second growth stands. This can assist in the creation of second growth forest ecosystem networks.

#### ***D. Manual harvesting of agro-forestry crops***

Harvesting of agro-forestry crops will use manual methods. Ripe coffee and fruits will be done through selective harvesting in which only ripe fruit are picked, resulting in a lower percentage of unripes in the harvest and higher prices for producers.

Tapping rubber using the low-frequency method will be implemented. This requires training of tappers. Fresh fruit bunches of oil palm will also be harvested manually.

An advantage in this type of harvesting is that trees can be planted on steep slopes resulting in more efficient use of land. Manual harvesting methods also require a large workforce which would increase employment opportunities for neighboring communities.

For all timber harvesting methods, naturally-growing indigenous species, whenever present, will be left standing to serve as future mother trees. Trees within 40 meters of stream and river banks shall be left standing as buffer zone to protect water resources. Assisted Natural Regeneration shall be implemented immediately after harvesting.

#### **1.5.3.2. Harvesting schedule**

Final harvest of forest tree plantation is scheduled at stand age 12, or earlier depending on market demand.

Available harvestable volume for plantations species in the Consolidated IFMA Project Area is 470,066.04 cu. m. programmed for harvesting within the next four (4) years period at an annual cut of 117,516.51 cu.m.

There is also a retrievable volume of 113,980.65 cu. m. of natural species in the DRF areas which would be affected during site preparation. These will be retrieved upon lifting of the moratorium on cutting trees in natural forests per EO 23.

#### ***1.5.4. Handling and Transport of Materials***

Logs felled are transported to the designated roadside landing by carabaos keeping to the identified skid trails.

Wreckers lift the logs to the hauling trucks for transport or they are loaded onto the truck by manual haulers. Unloading logs at the sea port happens in reverse with any of the two methods. The logs are shipped to the Recodo WPP in Zamboanga City. Wood waste are piled or crated at the harvesting site, loaded into hauling trucks for land or sea travel, until they are received at the Recodo WPP.

#### ***1.5.5. Forest Chemical Management***

Chemicals used in forest management generally consist of fertilizers and pesticides (herbicides, insecticides, fungicides). They are occasionally used to reduce mortality of desired tree species and improve forest production.

M&S Company will use organic or bio-fertilizers to correct nutrient deficiencies. In addition to releasing nutrients, as organic fertilizers break down, they improve the structure of the soil and increase its ability to hold water and nutrients. Since they are slow-release fertilizers, it's very difficult to over fertilize (and harm) the seedlings. There's little to no risk of toxic buildups of chemicals and salts that can be deadly to plants. Organic fertilizers are reproposedable, biodegradable, sustainable, and environmentally friendly.

M&S Company will implement Integrated Pest Management (IPM) strategies that have been developed to control forest pests without total reliance on chemical pesticides. The IPM approach uses all available techniques, including chemical and nonchemical. An extensive knowledge of both the pest and the ecology of the affected environment is necessary for IPM to be effective.

The following alternatives to pesticides are preferred:

- a. Use of manual weeding rather than chemical control;
- b. Protection of natural enemies of pests by providing a favorable habitat to house pest predators;

- c. Support and use of beneficial organisms, such as insects, birds, mites, and microbial agents, to perform biological control of pests; and
- d. Use of mechanical controls such as traps, barriers, and light, to kill, relocate, or repel pests

Pesticides may be necessary, however, to protect the establishment and growth, or maintenance, of desired species or conditions in the forest. Pesticide use may be extensive to deter wood boring insects from damaging stockpiled wood prior to removal from the IFMA area. Because forest pests are part of the forest ecosystem, any attempt to suppress pest with extensive pesticide use will undoubtedly influence the other components of the ecosystem.

Because pesticides can be toxic if misused, they must be mixed, transported, loaded, and applied correctly (according to label instructions) to prevent potential non-point source pollution. (USEPA, 2002).

The choice of pesticide to be used would depend on the following factors: biodegradability, toxicity to mammals and fish, occupational health and safety risks, and costs. M&S Company will seek advice from government authorities on which chemicals are safe to use and those that are banned.

Policies and practices on handling, storage and disposal of pesticides shall conform to the provisions of DAO 2013-22 (Revised Procedures and Standards for the Management of Hazardous Wastes (Revising DAO 2004-36)) and other relevant laws, rules and regulations.

With regards to application: aerial spraying will be avoided wherever possible; manufacturer's recommendations will not be exceeded; and no direct application to rivers, streams, or other surface water bodies.

#### Handling

- a. All pesticide products shall be shipped and stored in adequate containers with clearly identifiable labels showing content, expiration date, health hazards and first aid measures in case of accidental exposure or ingestion.
- b. Pesticides shall be stored in a locked and posted area.
- c. Pesticides shall not be transported or stored in common with food or beverages (including potable water).
- d. Protective gloves, shoes, a long-sleeved shirt and full trousers made from closely woven fabric shall always be worn by employees when mixing or applying pesticides. Employees shall have a spare change in clothing nearby. Contaminated clothing shall be promptly changed and washed.
- e. Respiratory devices as appropriate (per label or other manufacturer recommendations) shall be provided and used by all handlers and applicators.
- f. Employees shall be discouraged from smoking, eating or drinking while handling pesticides. Workers shall be encouraged to wash their hands thoroughly with soap and water before engaging in such activities. Adequate washing facilities will be made available to allow thorough hand washing prior to meals.
- g. When the job is finished, all workers shall be required to wash themselves and their clothing thoroughly with soap and water. Adequate facilities will be made available for this purpose.
- h. Equipment shall be cleaned in a special area where wash water will not come into contact with food or drinking water supplies.

#### Training

- a. Employees shall be trained on hazards, precautions and procedures for safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.
- b. Training shall incorporate information from the Material Safety Data Sheets (MSDSs) for potentially harmful materials.
- c. Personnel shall be trained in environmental, health and safety matters including accident prevention, safe lifting practices, the use of MSDSs, safe chemical handling practices, and proper control and maintenance of equipment and facilities.
- d. All applicators shall be properly trained in handling, mixing, application, and disposal of pesticides and product containers.

- e. All proposedly-trained employees shall work initially under supervision of trained and experienced applicators.

Other chemical management practices to be followed are:

- a. When aerial spray applications are necessary, drift or accidental application of chemicals directly to surface waters should be avoided. Appropriate buffer widths should be determined by considering the altitude of application, weather conditions, and drop size distribution. Careful and precise marking of application areas for aerial applications helps avoid accidental contamination of open waters (USEPA, 2002).
- b. Pesticides and fertilizers should be applied only during favorable atmospheric conditions. Pesticides should not be applied when wind conditions increase the likelihood of significant drift. It is also best to avoid pesticide application when temperatures are high or relative humidity is low because these conditions influence the rate of evaporation and enhance losses of volatile pesticides.
- c. Ensure that pesticide users abide by the current pesticide label, which might specify whether users be trained and certified in the proper use of the pesticide; allowable use rates; safe handling, storage, and disposal requirements.
- d. Locate mixing and loading areas, and clean all mixing and loading equipment thoroughly after each use, where pesticide residues will not enter streams or other water bodies.
- e. Dispose of pesticide wastes and containers in conformity with the provisions of DAO 2013-22.
- f. Take precautions to prevent leaks and spills.
- g. Check all application equipment carefully, particularly for leaking hoses and connections and plugged or worn nozzles. Calibrate spray equipment periodically to achieve uniform pesticide distribution and rate.
- h. Always use pesticides in accordance with label instructions, and adhere to all federal and state policies and regulations governing pesticide use.
- i. Develop a spill contingency plan that provides for immediate spill containment and clean-up, and notification of proper authorities.
- j. Maintain an adequate spill and cleaning kit that includes the following:
  - Detergent or soap.
  - Hand cleaner and water.
  - Activated charcoal, adsorptive clay, sawdust, or other adsorptive materials.
  - Lime or bleach to neutralize pesticides in emergency situations.
  - Tools such as a shovel, broom, and dustpan and containers for disposal.
  - Proper protective clothing.

## **1.6. Project Size**

The project denominated as IFMA No. 18-2007 covers an area of 29,085 hectares which currently has an available harvestable volume for plantations of an approximate volume of 470,066.04 cu. m. programmed for harvesting within the next four (4) years period at an annual cut of 117,516.51 cu.m, while there is a retrievable estimated harvestable volume of 207,908.01 cubic meters within Degraded Residual Forest area due for conversion to mixed forest plantation. The estimated daily harvest volume is 392 cu.m. for plantation species and 20 cu. m. for natural species at 300 working days per year.

## **1.7. Development Plan, Description of Project Phases and Corresponding Timeframes**

The development plan comprises of two major activities such as harvesting operations and development and management plan. It will be implemented through the general strategy of optimizing the productivity of the entire IFMA area on a sustainable basis yet consistent with the imperativeness of ecological soundness.

The general strategy for the development of the entire IFMA area is to fully utilize the productive potential of the area to produce wood raw materials and agricultural food crops with the least adverse effects on environmental stability and generate optimum socio-economic benefit for the company, the IFMA community particularly the ICCs, and the province as a whole, in a sustainable manner as possible. The overall plan for the development of the entire area is shown in the table below wherein specific management, regimes/ development interventions by land-use are presented.

*Table 1-3. Management Scheme per Type of Area*

<b>Vegetative Cover</b>	<b>Management scheme</b>		<b>Area (Has).</b>
Production Residual forest	2,116	- Manage as production natural forest where selective timber harvesting will be implemented once E.O 23 will be lifted.	264
		- Protection forest/buffer zone	423
Degraded Residual Forest	12,038	- Develop and manage into industrial plantation of mixed species consistent with Sec. 2.2 of E.O 23	9,823
		- Areas to be maintained as protection forest/ buffer zones	2,215
Established Plantations	10,442	- Continue protecting and managing as forest tree plantation with harvesting and replanting activities	10,442
Agro-forestry Plantations	1,043	- Continue protecting and managing as agroforestry plantation with harvesting and replanting activities	1,043
Brushland / Rocky Portion	2,713	- Develop into mixed fruit tree plantation and oil palm or rubber trees plantation	2,713,
Settlement Area	733	- Manage in place; provide employment opportunities and livelihood/ income-generating activities	733
<b>Total</b>	<b>29,085</b>		<b>29,085</b>

### **1.7.1. Pre-Operations/Pre Construction Phase**

#### **1.7.1.1. Consolidated IFMA 18-2007**

Pre-operations activities include the conduct of survey and mapping within the project areas. A 20% inventory was conducted by the CENRO in 2005 and a 5% timber inventory validation conducted by FMB personnel in 2012 over the Consolidated IFMA area. This was done to evaluate the forest resources available in the DRF and PRF forest in order to come up with the stocking and volume data. As of todate, there is an available volume of trees to be cut in approximate area of 2,313 hectares equivalent to 470,066.00 cubic meters for plantation species while, in degraded residual forest, there are retrievable volume of trees to be cut in an approximate area of 8,490.78 hectares equivalent to 202,434.97 cubic meters. These stand stocks are identified as matured trees and ready for harvesting schedule.

This phase also includes applying for and securing permits and clearances to enable the company to implement this IFMA Project.

M&S Company already established its camp in Sitio Plamango, Barangay Pamantingan, Esperanza. The headquarters include such as office buildings, staff houses, laborer's quarter, commissary, warehouse, motorpool, patrol tower, communication facilities and others. Repair and maintenance of these facilities will be conducted during this phase.

Dialogues with the different sectoral owners within the IFMA Area are also conducted.

Moreover, since the IFMA holder has been operating even before the consolidation of this project, it has already established different community development programs to enhance the living and socio-economic condition of the community. During this phase, the community development programs will be evaluated and enhanced as necessary.



### **1.7.2. Construction Phase**

Buildings and facilities for IFMA operations are already in place and no proposed construction is planned. Existing roads will be rehabilitated.

### **1.7.3. Operation Phase**

The Operations phase shall be initiated once the pre-operations activities have been completed.

This phase involves nursery management, plantation development and management, and forest protection activities.

#### **A. Nursery management**

The company has established nurseries in several strategic areas within the Consolidated IFMA areas. These are the nurseries which will supply seedlings for the proposed IFMA project.

The Bravo Central Nursery located at Sitio Bravo, Barangay Salumping has produced 240,370 seedlings of yemane, mahogany, bagras, mayapis (*Shorea palosapis*), and bagtikan (*Parashorea malaanonan*).



*Photo 1-1. Bravo Central Nursery*

The company also has nurseries for its agroforestry plantations: Dawang Nursery for coffee and Guimaras Nursery for durian. Other agroforestry species such as rubber and oil palm are also raised and/or cared for in these nurseries.



*Photo 1-2. Arabica Coffee at Dawang Nursery(left) and Durian at Guimaras Nursery*

For coffee production, the nursery will use well-selected seeds gathered from well-formed, healthy mother trees. From germination, the coffee seedlings will be planted in the nursery area at a spacing of 30 cm x 30 cm and it will be generally stumped, budded and transplanted when they attain a diameter of from 2 cm to 5 cm at the collar and when they develop brown bark coloration.

Oil palm seedlings will be raised and cultivated in the nursery before they are brought to the plantation area for planting.

#### *B. Plantation development and management*

Brushland/open areas and degraded residual forest (DRF) areas will be prepared for plantation development. This involves clear-cutting of trees and clearing of underbrushes in the areas delineated for plantation establishment except for indigenous species which will be not be cut. All trees removed shall be retrieved and utilized.

The area to be converted to plantation will be developed within five (5) years. Mixed fast growing species, fruit trees and other high-value agro-forestry species shall be planted in open/brush lands areas while rubber and forest trees will be planted in degraded residual forests to enhance forest cover that will serve as carbon sink. Planting schedules for the entire consolidated IFMA area are presented in **Tables 1-5 to 1-6** below.

*Table 1-4. Schedule and Area to be Planted in Open/Brushland Areas*

Year	Forest Tree			Agro-forestry			Total	%
	Yemane	Mangium	Sub-total	Rubber	Coffee/ Oil Palm	Sub-total		
1	150	200	350	90	104	194	544	20
2	150	200	350	90	104	194	544	20
3	150	200	350	90	104	194	544	20
4	150	200	350	90	104	194	544	20
5	150	200	350	82	105	187	537	20
<b>Totall</b>	<b>750</b>	<b>1,000</b>	<b>1,750</b>	<b>442</b>	<b>521</b>	<b>963</b>	<b>2,713</b>	<b>100</b>

*Table 1-5. Schedule and Area to be Planted in Degraded Residual Forests*

Year	Forest Trees					Rubber	Grand Total	%
	Bagras	Yemane	Mangium	Others	Total			
1	196	700.0	700.0	100.0	1,696.0	268.0	1,964.0	20
2	196	700.0	700.0	100.0	1,696.0	268.0	1,964.0	20
3	196	700.0	700.0	100.0	1,696.0	268.0	1,964.0	20
4	196	700.0	700.0	100.0	1,696.0	268.0	1,964.0	20
5	196	700.0	700.0	100.0	1,696.0	270.6	1,966.6	20
<b>Total</b>	<b>980</b>	<b>3,500.0</b>	<b>3,500.0</b>	<b>500.0</b>	<b>8,480.0</b>	<b>1,342.6</b>	<b>9,822.6</b>	<b>100</b>

When the timber stands reach maturity, these trees shall be subjected to harvesting for economic use, the site cleared, and then replanted. Agro-forestry crops will be harvested as they mature using methods appropriate for that crop.

The cutting cycle for forest tree plantations is 15 years while harvesting of agro-forestry crops will depend on the specie planted. In between harvesting periods, appropriate silvicultural practices will be applied to the proposedly-

established plantations. Pre-thinning operation of forest trees at the proposedly-established plantation shall take place at stands of four years followed by commercial thinning of 8-year old stands. The final cycle for tree cutting will be done when the stands are 12 -15 years old.

Immediately after final cutting and skidding, all equipment and temporary structures shall be removed. The harvested area will be cleared by the support group. The site will be prepared for replanting and then revegetated. Approximately 38,280,515 hills will be planted with seedlings of the preferred plantation species.

The manifested logs will be skidded, hauled and transported by truck and by boat to the Recodo Wood Processing Plant while fruits and products of the agro-forestry species will be transported to processing centers or traders as appropriate.

Development activities such as Assisted Natural Regeneration (ANR) and enrichment planting shall be undertaken on the proposedly-harvested area while Timber Stock Improvement (TSI) shall be conducted on the 10<sup>th</sup> year after harvest. Reforestation would also be implemented within the 20-meter buffer zones of rivers and streams.

Productive Residual Forest (PRF) will be maintained as both production and protection area. If and when the moratorium on cutting is lifted, mature trees and over-mature trees will be harvested. This will allow seedling, saplings, and healthier young trees to grow. Selective logging shall be employed in accordance with existing DENR laws, rules and regulations.

Initially, a total of 423 hectares in PRF and 2,215 hectares in DRF within 20-meters both sides of rivers/creeks, and those areas above 50% in slope and elevation of more than 1000 masl shall be allocated as protection forests. The same shall be managed through the conduct of ANR, enrichment planting, supplemental planting and /or Timber Stand Improvement. The actual status of the area shall however be subjected to the conduct of actual ground validation survey, hence, the extent thereof may be reduced or increased after the conduct of the validation.

This continuous cycle of development, management, and protection aims to address the steady demand for forest products without compromising the flow of environmental services from forests and the socio-economic benefits to people in the nearby communities.

### *C. Forest protection*

Activities are aimed at protecting water quality and biodiversity values in residual forests and plantation forests. These activities include protection and enhancement of riparian buffer zones, conserving indigenous species, and minimizing unintentional and human-induced risks.

Riparian buffer zones are twenty-meter strips of land along the edge of the normal high waterline of rivers and streams with channels of at least five (5) meters wide (PD 705). These are important barriers or treatment areas that protect water resources from non-point source pollution.

Recommended practices include:

- Native vegetation will be retained intact except where watercourse crossings are permitted
- Where harvesting near a buffer zone is planned, the boundaries of the buffer zone will be clearly marked before harvesting commences.
- Trees should not be felled into a buffer zone. Where this accidentally occurs, the head should be pulled clear unless unacceptable damage to the zone is likely to occur. Damage to vegetation should be avoided.
- Equipment/machinery shall not enter buffer zones except at designated watercourse crossings. Harvesting slash will not be pushed into buffer zones and slash heaps should be sufficiently separated from the buffer zone.

Risks to forests fall into two: unintentional or natural (fire, floods, and other acts of nature) and intentional or human-induced (illegal logging, intentional fire). They are key risks to project performance and success. Although all of the

risks inherent in forest development and management endeavors cannot be eliminated, steps can be taken to lower them through proper project design.

Fire, intentional or unintentional, is one of the threats to the IFMA project. The risk rate for fire is low during the rainy months of September to February but high during the dry season (March to August) since the climate change scenario predicts dry days becoming dryer and wet days becoming wetter in Sultan Kudarat.

Strategies for preventing and fighting fire include measures such as the establishment of fire towers in strategic locations of the project area to detect fire; a standby fire crew during the summer months when rainfall is considerably less than the rest of the year and a general patrol team trained in fire measures all year round, to take care of any occurrence of fire within or outside project boundaries; and fire lines in place to stop the spread of fire into, out of and within the project sites.

Regular training on firefighting is conducted in M&S Company as part of the emergency response plan. These workshops are an on-going capacity building initiative which the company intends to use. Two approaches are used in these trainings:

- a. Theoretical knowledge: workers are trained on issues including the effect of forest and buildings fires, types of forest fires, fire protective gears, etc
- b. Practical implementation: workers are trained on forest and building fire suppression using modern technology and other items used in firefighting.

During the training, practical demonstrations to show the ways to attack forest fires are conducted. Training on the use of other firefighting equipment are also carried out at the same time.

Regular patrols around project sites aim to reduce illegal entry and lighting of fires which could spread quickly during dry months. Employees are also oriented on proper behavior in the area to prevent fire.

Trees burned will be replaced with proposed seedlings of the same specie. Standard procedures for digging, spacing, planting, watering, brushing, and other protection and maintenance activities will be followed.

Information on disturbances such as fires (intentional or unintentional), flash floods, landslides, pest outbreaks, illegal felling, intentional fires will be monitored and recorded. Monitoring will include date, location, area affected (as per the GPS coordinates or field survey), number of trees lost, tree species, corrective measures implemented.

#### **1.7.4. Abandonment Phase**

Abandonment is not contemplated within the next 14 years. However, if and when there is an overpowering reason to do so, this will be undertaken by a Contractor who will hire and supervise its workers. Before the scheduled activities for the abandonment phase, the local government units and DENR shall be informed. This includes the barangay LGUs and municipal LGUs within the IFMA area as well as the Provincial Government of Sultan Kudarat. In addition, DENR esp. the EMB shall be be informed.

It shall be ensured by the management that no structures left behind can affect human safety and water quality. All materials shall be removed and any land contaminated with oily wastes/garbage should be cleaned/remedied. Waste materials that can still be salvaged, reused and recycled shall be kept or sold to junk shops. The unusable municipal wastes shall be properly disposed of in the LGU's dumpsite facility. The equipment shall be sold or transferred to the company's Recodo wood processing plant. It shall be ensured that hazardous wastes like oil and grease shall be properly stored if reusable or properly disposed of.

The concerned LGUs shall be informed about the scheduled clean-up activities for them to be aware and freely monitor the progress of said clean up. Clean-up is estimated to take a month to ensure that all materials shall be removed. The management will also ensure that large exposed areas (especially in the nursery site) will be revegetated with fast growing species and the abandoned logging or plantation roads will also be replanted with trees.

To ensure that water quality is not affected, the water will be sampled immediately in all the water sampling stations after the abandonment activities are conducted. Levels for total suspended solids and coliform will be monitored. Moreover, to ensure that there are no solid wastes left in the area, on-site inspection will be conducted in coordination with the Multi-partite monitoring team.

## 1.8. Manpower

During the pre-operations stage for the IFMA, only Consultants will be contracted as needed.

IFMA operations would require mostly males except in nurseries where qualified females are preferred. About 505 personnel consisting of 482 males and 23 females will be required during the operations phase. The jobs are mostly for unskilled and skilled personnel.

Qualified local residents will be given priority for employment. About 80-90% of the total personnel requirements will be for local residents. Employment applications will be coursed through the barangay captains of the direct impact barangays of the consolidated IFMA (Project Area).

The IFMA has a contract period of twenty-five (25) years starting in the year 2007, renewable for another 25 years. The remaining contract period until renewal is about 14 years only. MCSI management will do its best to implement effective plantation development and management. If the IFMA is not renewed or major circumstances necessitate project abandonment, the management shall endeavor to implement measures that will mitigate and/or manage identified risks. Manpower requirement during the abandonment phase is 196.

Distribution of manpower requirement per department per phase is presented in **Tables 1-7 to 1-8** below:

*Table 1-6. Manpower Requirement – Operations Phase*

<b>IFMA Operations</b>						
	<b>Total</b>	<b>M</b>	<b>F</b>	<b>Regular</b>	<b>Contractual</b>	<b>Seasonal</b>
<b>Administrative/Staff</b>						
Operations Manager	1	1		1		
Company Forester	2	2		2		
HRMD	3		3	3		
Accounting	3		3	3		
Auditing	3		3	3		
Security	150	150		150		
Motor Pool	30	30		30		
Pol Products	5	5		5		
Warehouseman	2	2		2		
Service Driver	5	5		5		
Utility	5	3	2	5		
Sub-total	209	198	11	209	-	-
<b>Production</b>						
Superintendent	3	3		3		
Foreman	5	5		5		
Scalers	14	14		14		
Fell and Buck	14	14			14	
Carabao Riggers	50	50			50	
Manual Haulers	50	50			50	
Sub-total	136	136	-	22	114	-

<b>Road Maintenance</b>						
Foreman	1	1		1		
Backhoe Operator	1	1		1		
Road Grader Operator	1	1		1		
Bulldozer Operator	1	1		1		
Payload Operator	1	1		1		
Dumptruck Driver	5	5		5		

Boulders	5	5				5
Sub-total	15	15	-	10	-	5
<b>Hauling</b>						
Supervisor	1	1		1		
Truck Master	1	1		1		
Hauler Driver	10	10			10	
Sub-total	12	12	-	2	10	-
	<b>Total</b>	<b>M</b>	<b>F</b>	<b>Regular</b>	<b>Contractual</b>	<b>Seasonal</b>
<b>Reforestation</b>						
Refo Head	1	1		1		
Accounting	1		1	1		
Auditing	1		1	1		
Block Incharge	5	5		5		
Field Inspector	5	5		5		
Nursery	20	10	10			20
Plantation Workers	100	100			100	
Sub-total	133	121	12	13	100	20
<b>TOTAL</b>	<b>505</b>	<b>482</b>	<b>23</b>	<b>256</b>	<b>224</b>	<b>25</b>

Table 1-7. Manpower Requirement – Abandonment/Decommissioning Phase

	<b>Total</b>	<b>M</b>	<b>F</b>	<b>Regular</b>	<b>Contractual</b>	<b>Seasonal</b>
<b>Administrative/Staff</b>						
Operations Manager	1	1		1		
Company Forester	2	2		2		
HRMD	1		1	1		
Accounting	1		1	1		
Auditing	1		1	1		
Security	150	150		150		
Motor Pool	5	5		5		
Warehouseman	1	1		1		
Service Driver	3	3		3		
Utility	2	1	1	2		
Sub-total	167	163	4	167	-	-
<b>Road Maintenance</b>						
Foreman	1	1		1		
Backhoe Operator	1	1		1		
Road Grader Operator	1	1		1		
Bulldozer Operator	1	1		1		
Payload Operator	1	1		1		
Dumptruck Driver	2	2		2		
Boulders	2	2			2	
Sub-total	9	9	-	7	2	-
	<b>Total</b>	<b>M</b>	<b>F</b>	<b>Regular</b>	<b>Contractual</b>	<b>Seasonal</b>
<b>Reforestation</b>						
Refo Head	1	1		1		
Block Incharge	2	2		2		
Field Inspector	2	2		2		
Nursery	2	1	1		2	
Plantation Workers	10	10			10	
Sub-total	17	16	1	5	12	-
<b>TOTAL</b>	<b>193</b>	<b>188</b>	<b>5</b>	<b>179</b>	<b>14</b>	<b>-</b>

## 1.9. Project Cost

The estimated project cost for the proposed plantation development and harvesting activities of M & S Company Inc. is PhP 6,539,419,705.07 or Php 6.5B



## 2. ASSESSMENT OF ENVIRONMENTAL IMPACTS

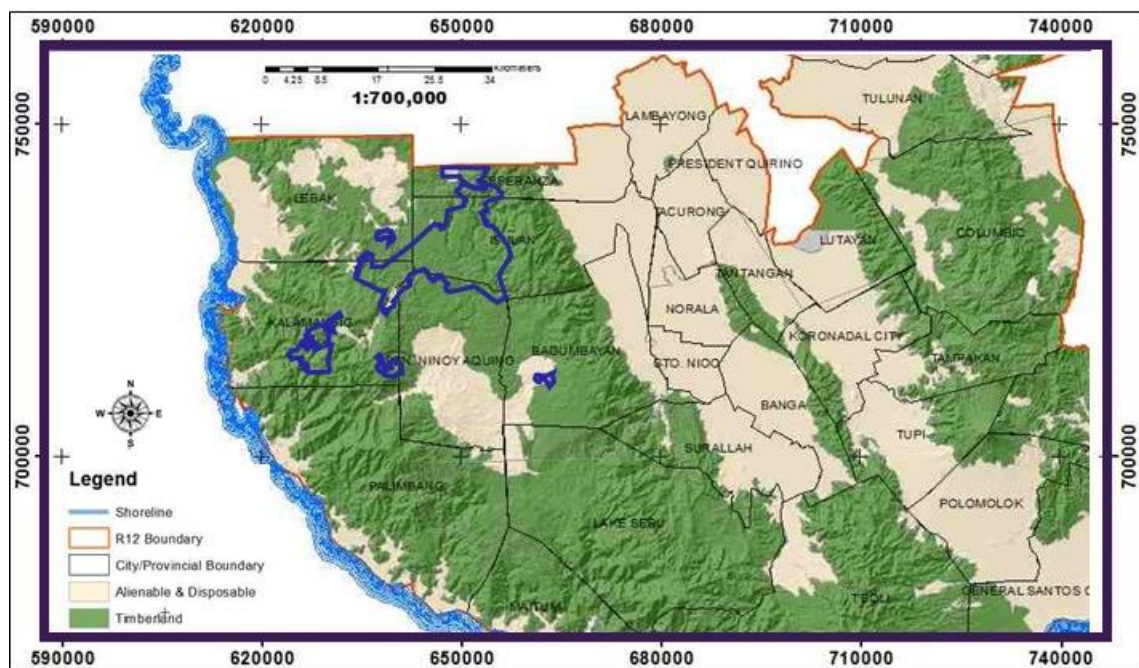
### 1.10. The Land

#### 1.10.1. Baseline Environmental Conditions

##### 1.10.1.1. Land Use and Classification

The province has a total land area of 513,530 hectares of which 248,288 hectares or 48.4% are alienable and disposable while the rest are timberlands. (**Map 2-1**). The consolidated IFMA Project Area lies entirely within the timberlands area.

*Map 1-6. Land Classification*



Source: DENR Region XII [www.r12.denr.gov.ph](http://www.r12.denr.gov.ph)

Based on data from the Housing and Land Use Regulatory Board (HLURB), the province of Sultan Kudarat does not have any approved Provincial Physical Development and Framework Plan (PPDFP) while its municipalities do not have updated Comprehensive Land Use Plans. Thus, land use data is culled from other sources. **Table 2-1** below shows the existing land uses in the Province of Sultan Kudarat.

*Table 1-8. Existing Land Use, Province of Sultan Kudarat*

Land Use	Area (has.)	%
Forestland	258,433	50.3
Agricultural land	229,909	44.8
Non-agricultural land	5,958	1.2
Fishing ground	12,421	2.4
Lakes and other bodies of water	5,237	1.0
Fishponds	1,572	0.3
<b>Total</b>	<b>513,530</b>	<b>100.0</b>

*Source: 2010 Socio-Economic Profile, Sultan Kudarat Province*

More than half of the entire province is forestland (50.32%) while 44.77% is utilized for agricultural activities. Fishing grounds occupies 2.42%, non-agricultural land, 1.16%, fishponds, 0.31 and lakes and others bodies of water are accounted at 1.02%.

**Map 2-3** overleaf shows the existing land uses in the direct impact barangay of Pamantingan and in the surrounding indirect impact barangays. Most of the land in the barangays are protection and production forests. Settlements (residential areas) are few and far in between. There is an eco-tourism area in Salumping surrounded by agricultural land.

Some parts of the IFMA are in the protected forest area while the rest are in the production forests.

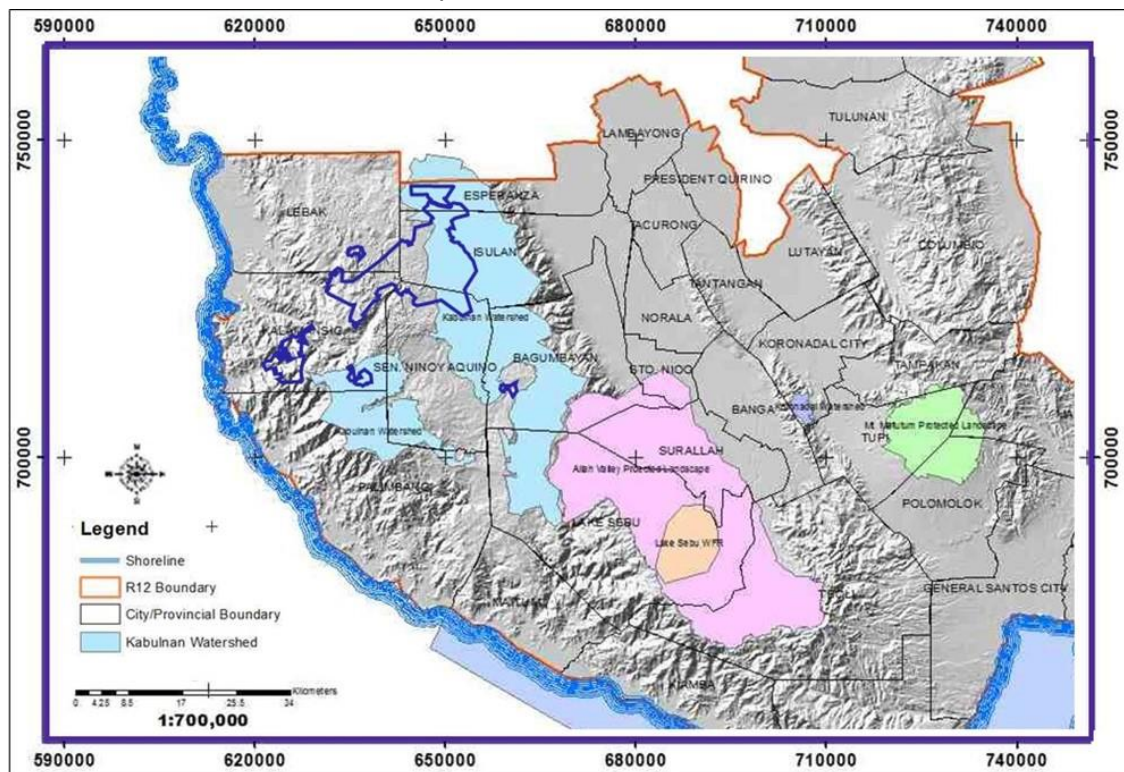
According to the proposed Esperanza Forest Land Use Plan (FLU), Barangay Pamantingan has 4,060.01 hectares of forestland which are zoned as follows: production forest - 2,817.41 has., protection forest – 600 has., and open access forest - 642.6 has. Areas of natural forest cover with the slope of 19% and above and an elevation of 500 - 1000 m above sea level are set aside as protection forests while forestland not belonging to this category are production forests. The open access areas are those which Esperanza intends to allocate to stakeholders and manage sustainably. Esperanza hopes to persuade local communities to get involved in the co-management forests by granting each resident household a one-hectare area of land as an incentive. These areas of land have to be used to cultivate forestry species, and thus allow the households to provide for their own needs

#### *A. Environmentally Critical Area*

Proclamation No. 241 (February 8, 2000) established the Kabulnan River Watershed Forest Reserve (KRWFR) for the purpose of protecting, maintaining or improving the water yield and providing restraining mechanism for inappropriate forest exploitation and disruptive land-use in the area. As proclaimed, KRWFR covers 116,451.83 hectares in the municipalities of Esperanza, Isulan, Bagumbayan, Senator Ninoy Aquino, Kalamansig, and Palembang all in the province of Sultan Kudarat, municipality of Ampatuan in the province of Maguindana, municipality of Lake Sebu in the province of South Cotabato. (**Map 2-2**). A portion of Block II of consolidated IFMA Project lies on the western section of KRWFR.

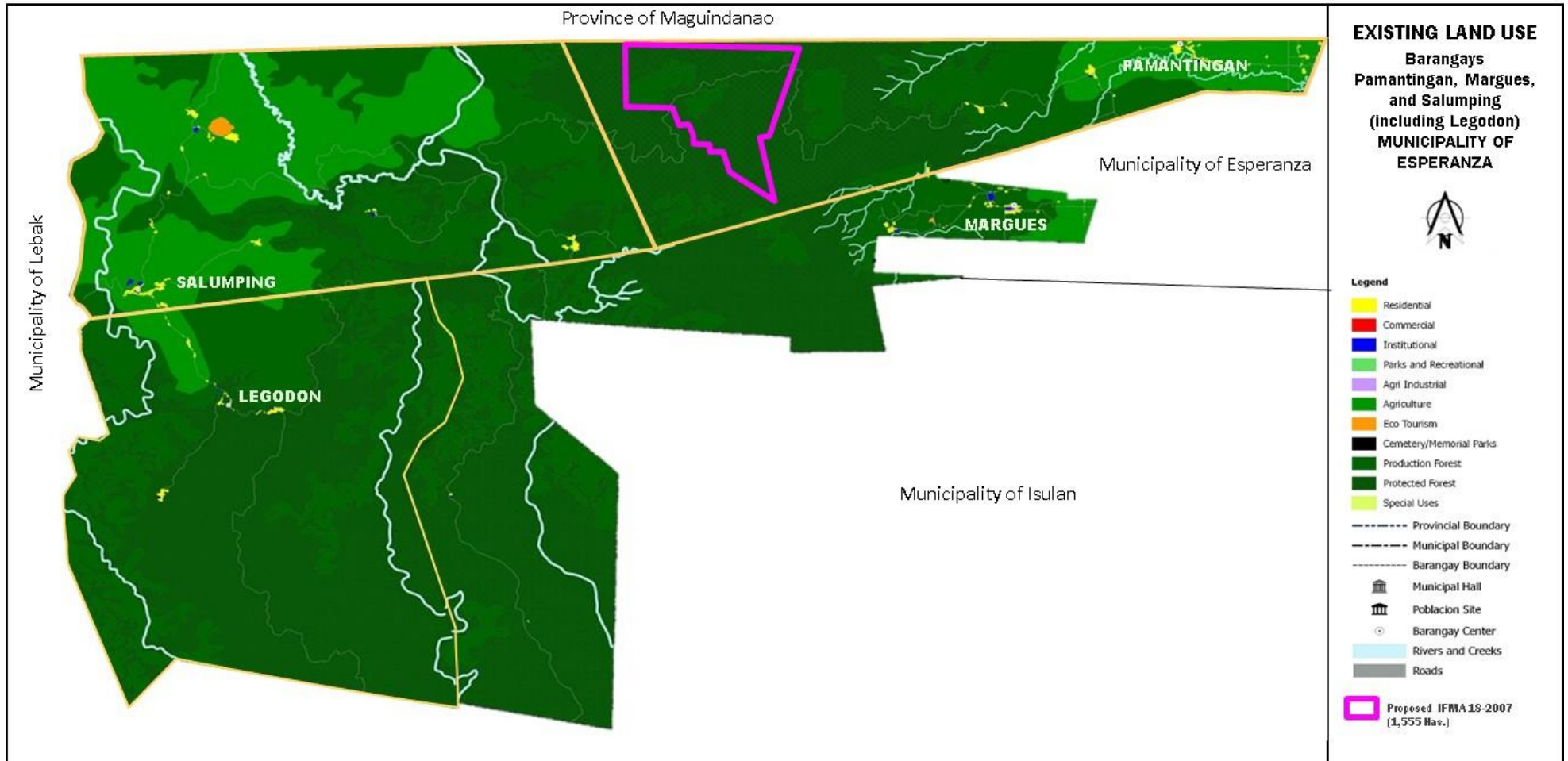


*Map 1-7. Protected Areas*



Source: DENR Region 12 [www.r12.denr.gov.ph](http://www.r12.denr.gov.ph)

Map 1-8. Existing Land Uses in Direct and Indirect Impact Barangays of the Proposed IFMA Project

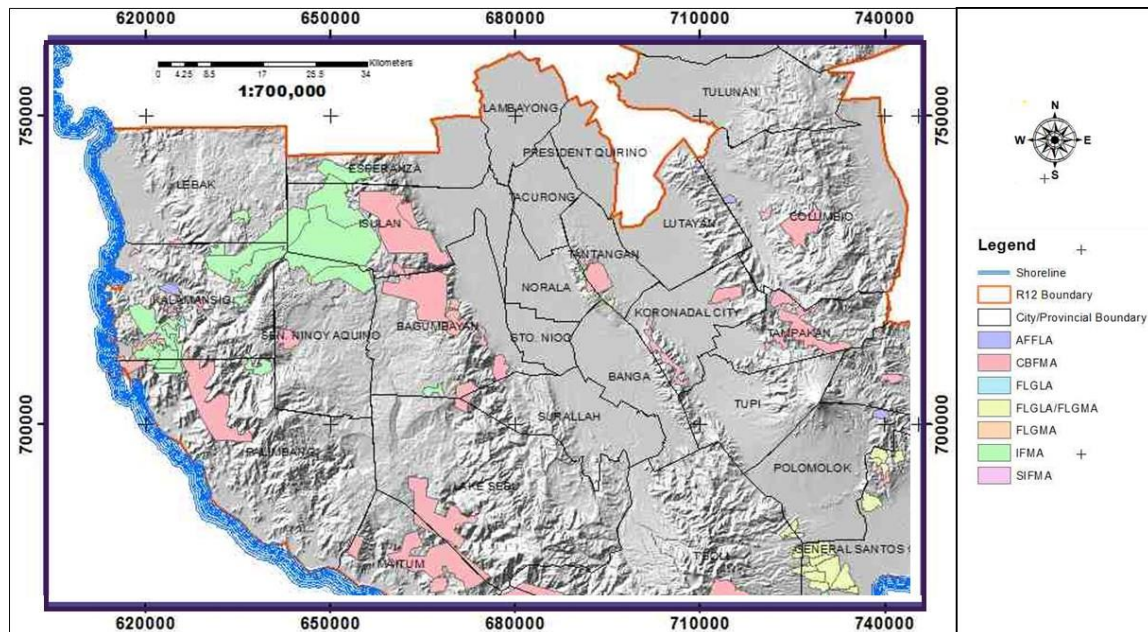


Source: Municipal LGU of Esperanza, MPDO

## B. Land Tenure

Areas with tenurial instruments near the consolidated IFMA areas are those with Community-Based Forest Management Agreements (CBFMA). (**Map 2-4**). These areas do not overlap with the consolidated IFMA project.

*Map 1-9. Areas with Tenurial Instruments*



Source: DENR Region 12, [www.r12.denn.gov.ph](http://www.r12.denn.gov.ph)

As of March 31, 2018, there are three CADTs at or near the consolidated IFMA Project Area. (**Table 2-2**).

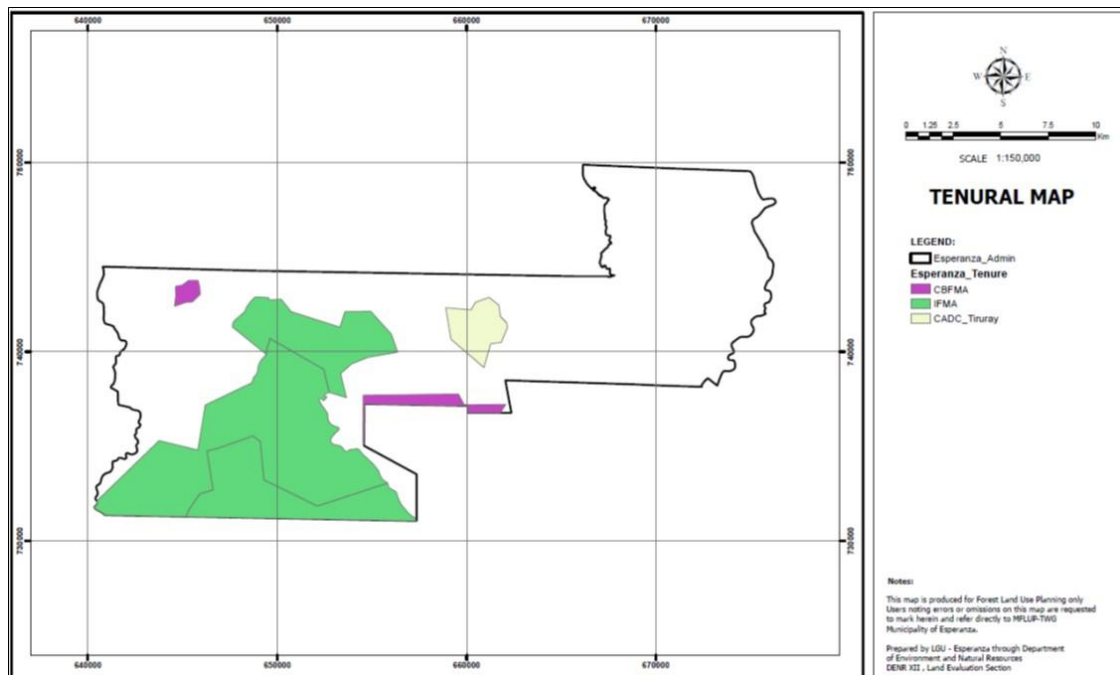
*Table 1-9. List of CADT Areas Near Project Site*

CADT No.	En Bank Resolution No.	Date Approved	Location	Area (Has)	IP Right Holders
R12-SEN-0609-111	108-2009-AD	6/17/2009	Mun. of Senator Ninoy Aquino (Kulaman)	26,994.2158	3,904
R12-KAL-1213-166	163-2013-AD	12/11/2013	Sitios Pungpungan 1 & 2, Samadi, Bawing, Magwawa and Agsam, Brgy. Limulan, Mun. of Kalamansig	3,377.8275	1,007
R12-ESP-0117-214	211-2017-AD	1/24/2017	Brgys. Margues & Pamantingan, Mun. Of Esperanza	1,253.5658	1,454

Source: Masterlist of Approved CADTs ([https://www.doe.gov.ph/sites/default/files/pdf/eicc/summ\\_of\\_cadt\\_per\\_year\\_as\\_of\\_march\\_31\\_2018.pdf](https://www.doe.gov.ph/sites/default/files/pdf/eicc/summ_of_cadt_per_year_as_of_march_31_2018.pdf)). Accessed November 6, 2018.

A map prepared by the Municipal LGU of Esperanza for Forest Land Use Planning purposes (**Map 2-5** overleaf) indicates there is no overlap with the identified CADC which has been approved as CADT R12-ESP-0117-214 (see **Table 2-2** above).

*Map 1-10. Esperanza Municipal Map showing CADC Area*



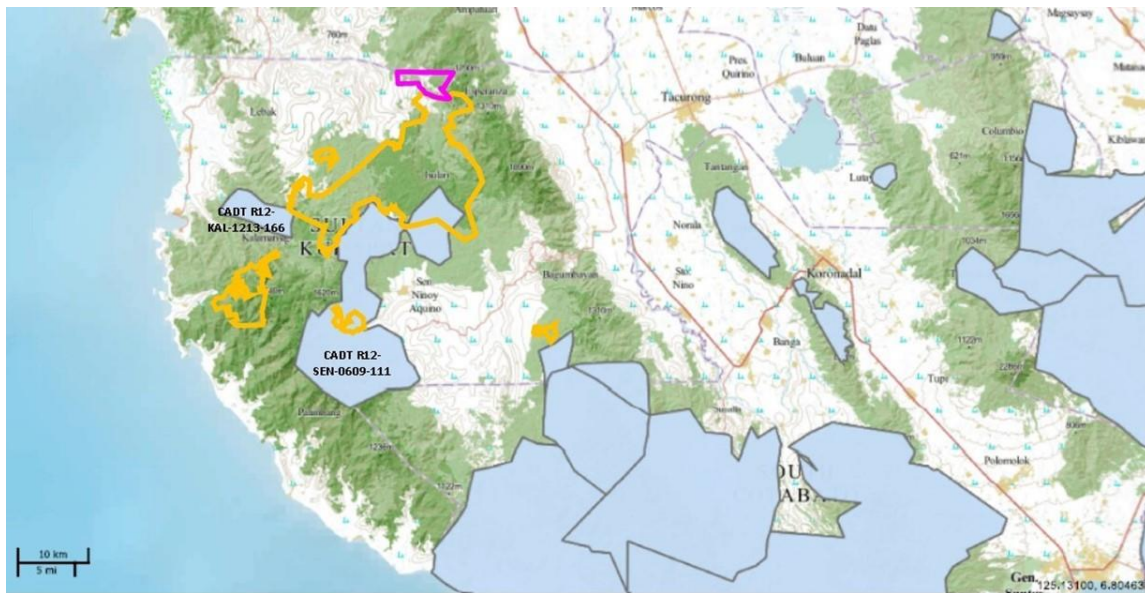
*Source: Esperanza Municipal Planning and Development Office*

**Map 2-6** below shows the indicative area of the other two CADTs near the Project Area. There appears to be an overlap of the CADT in SNA with a portion of Block II and Block IV of the consolidated IFMA 18-2007. The M&S has the legal prior rights of the area and they have been operated for over 20 years in managing, developing, protecting and maintaining the vast forest areas into a sustainable and productive state. These CADT's were just recently registered and approved thru NCIP. Furthermore, there was indeed no actual ground survey, verification and mapping being conducted in the area, thus metes and bounds were erroneously specified in the map.

Way back in 1991, when the IFMA was granted to Silvicultural Industries Industries Inc prior its integration to IFMA 18-2007 under M&S Company Inc, there was no existing ancestral lands in the area. The company however, assisted and have manage-in-placed those neighboring Indigenous Cultural Communities (ICC's) and provided them employment as plantation workers in the IFMA area.



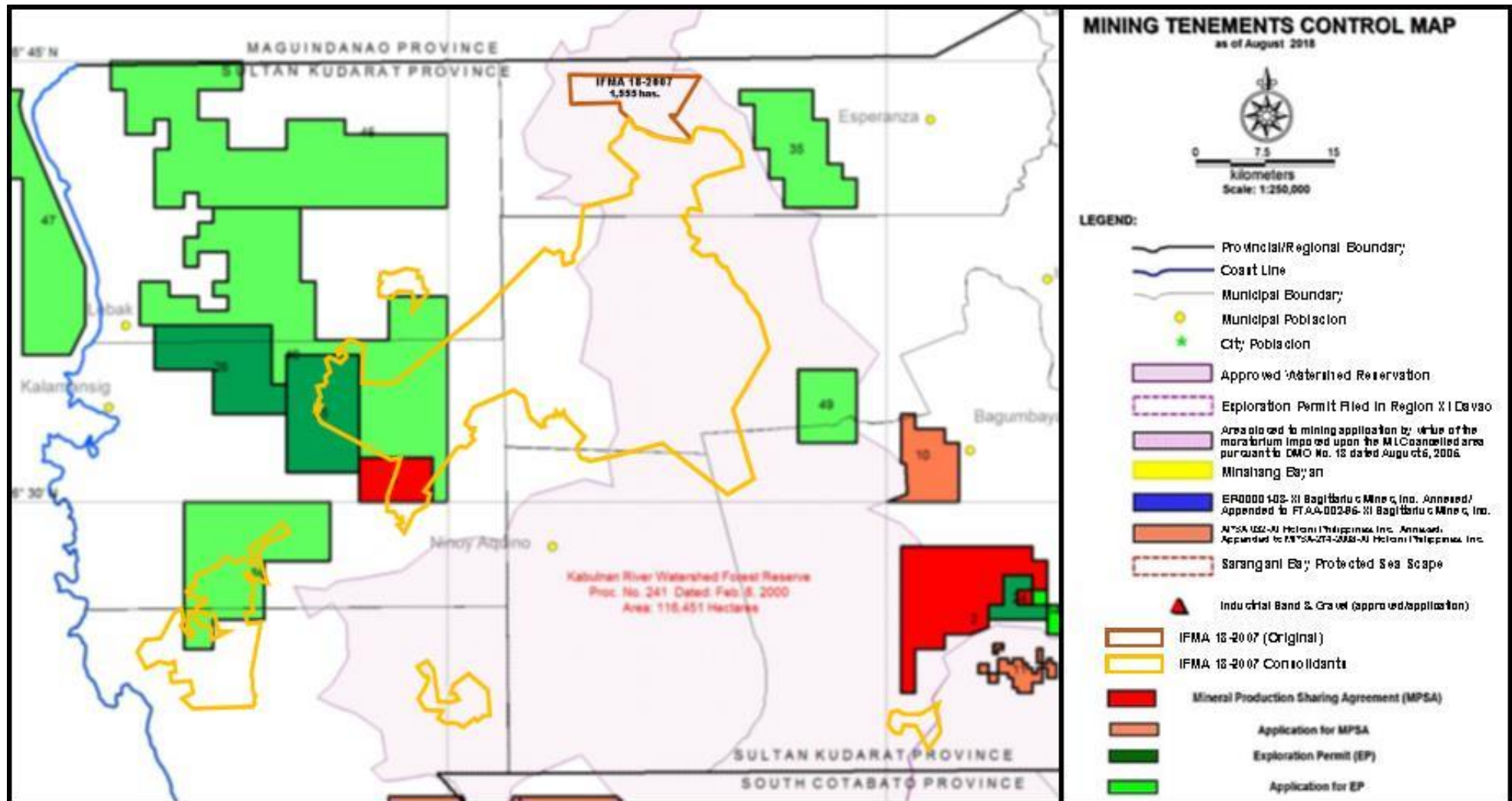
*Map 1-11. CADT Areas near Project Area*



Source: [www.geoportal.gov.ph](http://www.geoportal.gov.ph)

There are portions of the consolidated IFMA Project Area that are overlapped by areas currently with mining permit, exploration permit or those applying for an exploration permit. (**Map 2-7** overleaf). More particularly, these overlapping areas include the area for which Southcenmin Mining Corp. and Bo Long Philippines Mining Inc. are applying for exploration permits and areas for which RX II Mineral Development Corp has an exploration permit. The map also indicates an overlap with the Mineral Production Sharing Agreement (MPSA) of South Davao Development Co. Inc.

Map 1-12. Mining Tenements Map



Source: MGB Region XII

### 1.10.1.2. Geology/Geomorphology

#### *A. Topography, slope and elevation*

The province of Sultan Kudarat's terrain is diverse with extensive coast, plains and valleys, hills and mountains. **(Map 2-8** overleaf).

About 29.0% of the province's land area is level to nearly level; these are slopes suitable for agriculture, residential, commercial, industrial and urban land uses. Approximately 19.7% have steep slopes (30 - 50%) which are reserved for production forests and reforestation. Areas with very steep slopes comprise 15.0%. **(Table 2-3)**.

*Table 1-10. Land Area by Slope Category, Province of Sultan Kudarat*

<b>Description</b>	<b>Slope Range</b>	<b>Area (Has.)</b>	<b>%</b>
Level to nearly Level	0 - 3%	148,671	29.0
Gently Sloping to Undulating	3 - 8%	15,242	3.0
Undulating to rolling	8 - 18%	77,507	15.1
Rolling to moderately steep	18 - 30%	93,860	18.3
Steep	30 - 50%	101,028	19.7
Very steep	Over 50%	77,222	15.0
Total		513,530	100.0

*Source: 2010 Socio-Economic Profile, Sultan Kudarat Province*

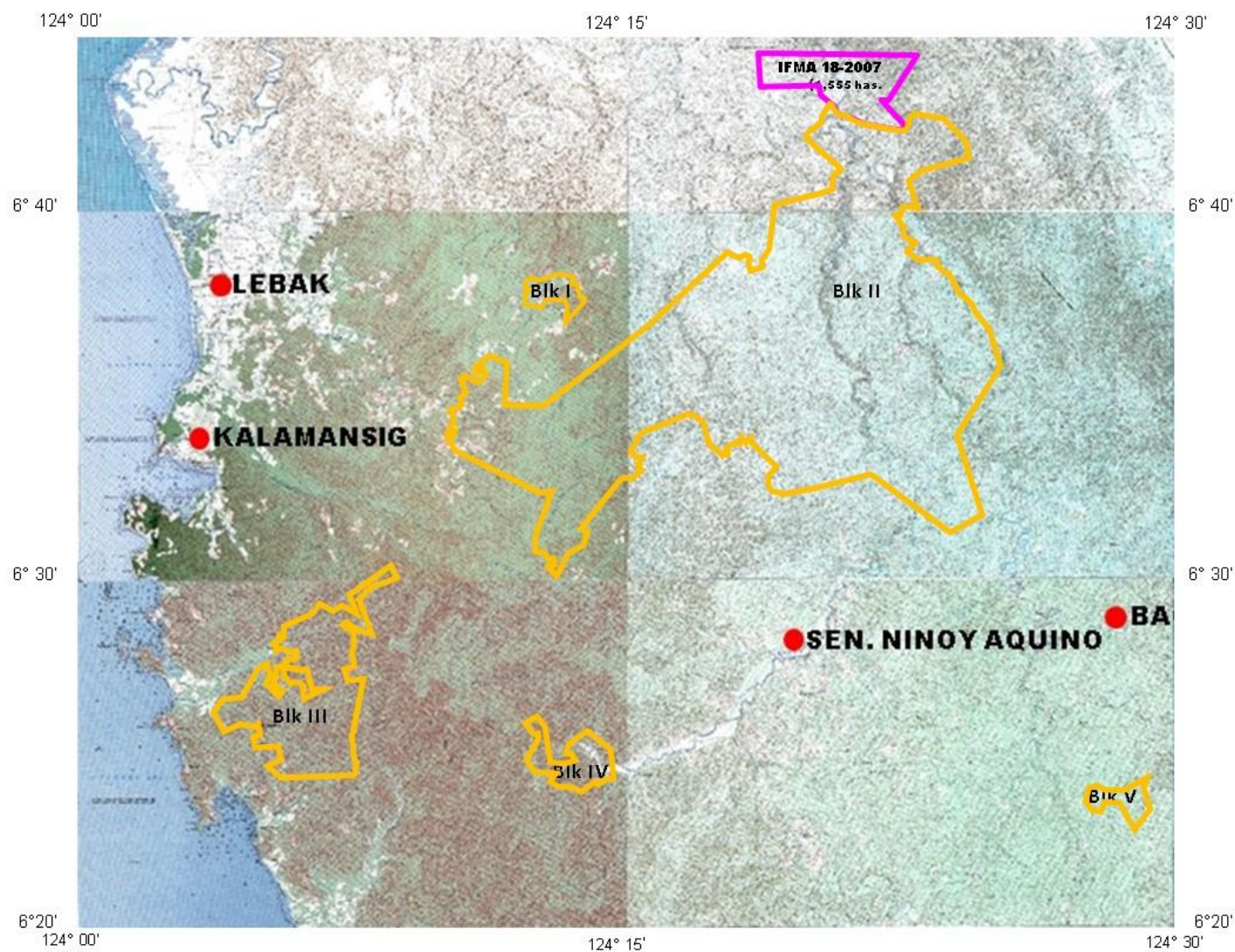
At the province's western edge, a relatively low mountain system, rises from the beaches and bays of the Celebes Sea coast and dips towards the valleys of Lebak and Kalamansig at the foot of the Daguma Mountain Range. Extending northwest-southeast, with elevations 800 – 1,890 meters above sea level, the Daguma Mountain Range covers the western parts of the municipalities of Esperanza, Isulan, and Bagumbayan. Another extensive mountain range, the Alip Mountain Range, lies near the eastern boundary of the province in the Municipality of Columbio. Between these two mountain ranges lie fertile valleys.

Northwest of Daguma are the Montod and the Talayaan mountain ranges. The Project Area lies west of the Daguma Mountain Range and south of the Montod and Talayan mountain ranges.

Elevation within the IFMA areas are about 400-1,200 masl.



*Map 1-13. Topographic Map*



Source: NAMRIA



The rock formations in the Province of Sultan Kudarat are Sedimentary and Metamorphic Rocks from Cretaceous-Paleocene to Recent in ages; Igneous Rocks from Cretaceous-Paleocene and Neogene in ages; and Volcanic Rocks that are Cretaceous-Paleocene to Pliocene-Quaternary Rocks in ages. (**Map 2-9**). The Consolidate IFMA Project Area is predominantly underlain by Cretaceous-Paleogene Rocks (Kpg).

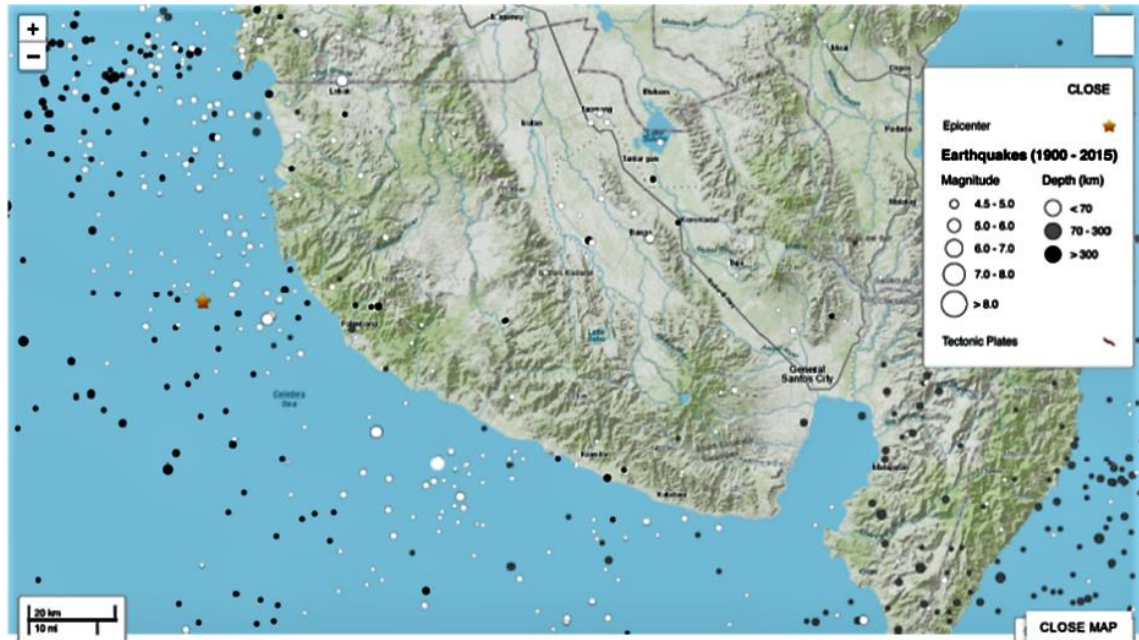
Map 1-14. Geologic Map of Region XII SOCCSKSARGEN



The seismicity of Mindanao is mostly due to the presence of four (4) active trenches – Philippine, Davao, Cotabato and Sulu trenches; and two (2) fault systems with numerous subfaults and lineaments – Philippine and Western Mindanao (Sindangan-Cotabato) faults. These structures

generate 60 medium and large-magnitude earthquakes every year. The areas around the Philippine and Cotabato trenches are considered the most active as they account for about 65% of the major earthquakes in the island.

*Map 1-15. Seismicity in Mindanao*



Source: US Geological Service, <https://earthquake.usgs.gov>, Accessed 11/8/18

The most destructive earthquake in the region was the 1976 M7.6 Moro Gulf earthquake which generated a tsunami that resulted in more than 5000 deaths in the coastal communities in North and South Zamboanga del Norte and Del Sur, Lanao del Norte and Del Sur, North Cotabato, Maguindanao and Sultan Kudarat and in the neighboring Sulu Islands.

#### *D. Geologic Hazards*

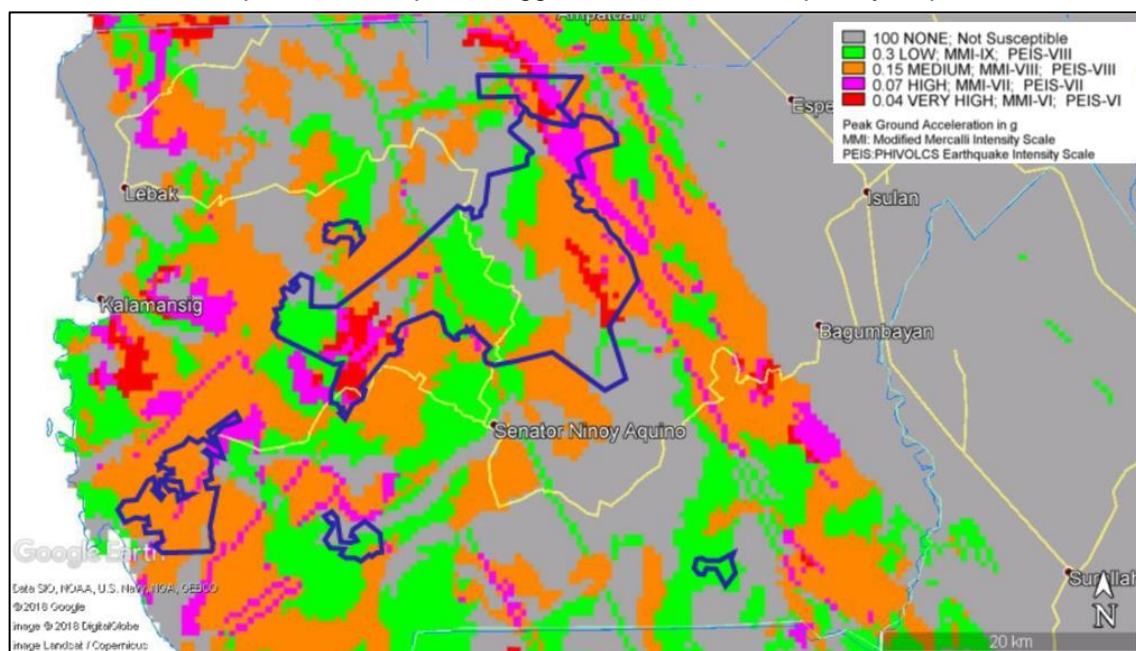
The Consolidated IFMA Project Area is approximately 100 km east of the Cotabato Trench and about 12 km west of the active Mindanao Fault: Daguma Extension (**see Annex C: Distribution of Active Faults and Trenches in Region XII**). Being situated within a seismically active region, the Consolidated IFMA Project Area is susceptible to earthquake-related hazards. The earthquake-related hazard that could affect the area is intense ground shaking.

Intense ground shaking is the main hazard associated with earthquakes, with ground rupture/fissuring, liquefaction, and landslides as collateral hazards. The intensity of ground shaking is magnitude-dependent, decreasing with distance from the source, and ground condition.

The Consolidated IFMA Project Area is not susceptible to liquefaction based on the Active Faults and Liquefaction Susceptibility Map of Region XII (**see Annex D**). However, some parts of the project area are susceptible to earthquake-triggered landslides as shown in **Map 2-11**.



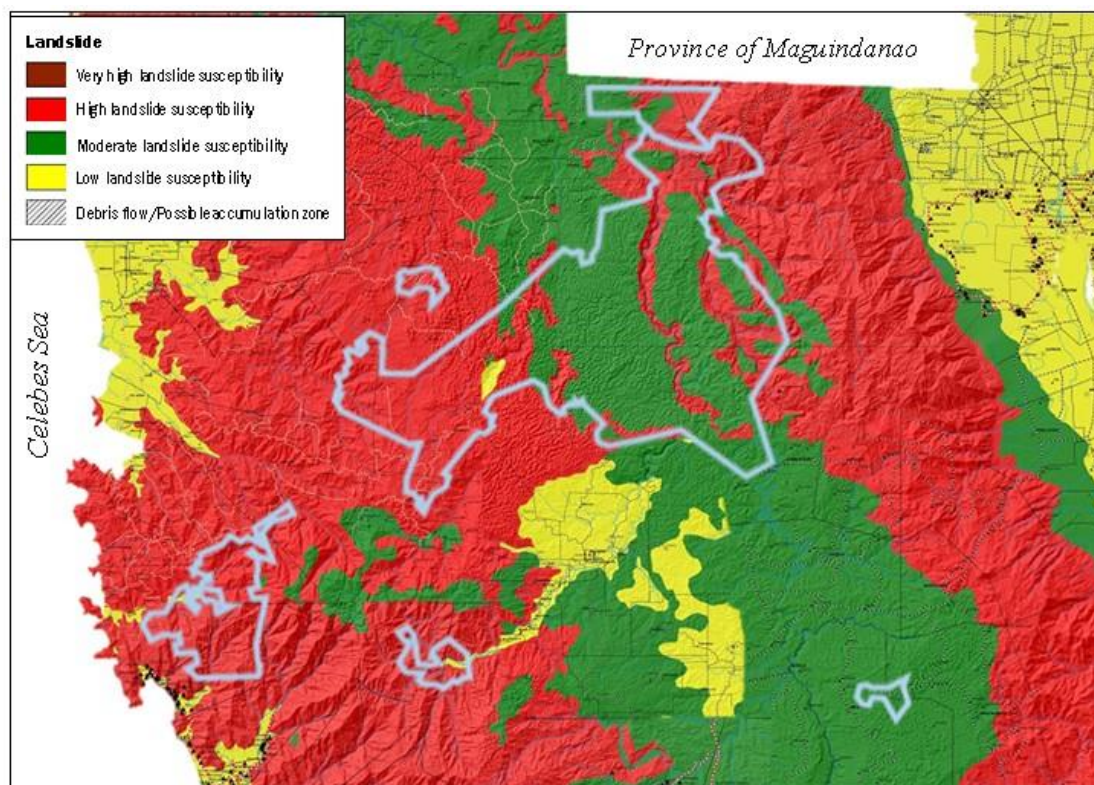
*Map 1-16. Earthquake-Triggered Landslide Susceptibility Map*



Source: PhilVOLCS

The most frequent and widespread damaging landslides in the Philippines are induced by prolonged or heavy rainfall. **Map 2-12** shows that some parts of the Project are situated in areas which are highly susceptible to landslides. These are areas with steep to very steep slopes underlain with weak materials.

*Map 1-17. Landslide Susceptibility Map*



Source: Mines and Geosciences Bureau [www.mgb.gov.ph](http://www.mgb.gov.ph)

### 1.10.1.3. Pedology

The soil map of the Philippines (**see Annex E**) indicates that the soils in the Consolidated IFMA Project Area are Acrisols. An Acrisol is a Reference Soil Group of the World Reference Base for Soil Resources (WRB). It has a clay-rich subsoil and is associated with humid, tropical climates and often supports forested areas. The soil type within the Consolidated IFMA Project Area is clay loam, silty loam, and clay, pale brown to dark brown in color that can be seen in sub-soil. When dry, the soil is dark brown, granular, slightly hard and brittle which becomes sticky when moistened.

M&S Company periodically conducts soil profiling. A survey was conducted on March 2015 and identified 18 sampling pits within the Project Area in Barangay Pamantingan, Municipality of Esperanza. Pits 1-6 were located in Sitio Sampiniton, pits 7-13 in Sitio Narra, and pits 14-18 in the Madaya area.

Soil samples were analyzed for pH, % organic matter, potassium, phosphorous, sulfur, calcium, magnesium, sodium, iron, copper, manganese, boron, and zinc. **Table 2-4** presents the results of the analysis of the soil samples.

*Table 1-11. Results of Analysis for Soil Samples - Survey Conducted March 2015*

PIT #	pH	%		PARTS PER MILLION (PPM)									
		OM	P	S	K	Ca	Mg	Na	Mn	Zn	Fe	Cu	B
1	6.35	4.99	2	21	275.68	2,130.40	237.20	223.40	97.75	8.74	24.67	2.04	0.34
2	5.62	3.98	4	97	116.86	2,517.20	410.80	95.68	124.06	6.07	4.67	2.82	0.23
3	6.36	6.86	2	44	164.54	1,591.20	172.40	107.50	21.02	0.88	6.35	0.93	1.11
4	6.54	6.66	3	41	342.12	3,455.20	368.80	89.30	91.52	2.15	5.94	0.50	0.23
5	6.12	6.73	ND	69	37.24	2,710.00	131.60	105.26	23.78	1.93	37.90	4.43	0.12
6	6.30	6.06	2	28	181.52	3,266.00	552.00	67.90	60.54	4.16	38.79	2.44	0.58
7	6.42	6.86	2	65	49.38	1,243.60	102.80	118.12	14.25	0.93	6.08	0.58	0.15
8	6.46	6.73	ND	69	87.74	1,595.20	130.80	81.52	20.85	1.06	5.48	0.87	0.61
9	6.38	5.99	2	61	113.26	1,728.00	76.40	122.50	26.69	1.67	7.23	1.62	0.28
10	6.95	3.65	ND	41	153.58	1,790.40	229.60	125.82	48.58	3.34	10.20	1.97	0.85
11	6.34	6.86	2	31	62.46	3,006.40	146.40	597.44	34.92	2.59	5.81	0.68	0.50
12	6.60	0.97	ND	11	60.80	2,726.00	415.60	281.08	23.21	4.54	32.22	4.17	0.38
13	6.93	3.65	2	52	102.72	1,275.20	180.00	660.50	48.97	7.55	27.31	2.18	0.68
14	6.60	0.90	ND	37	26.20	1,162.00	108.00	9.56	18.48	5.24	39.08	3.71	0.23
15	5.97	4.25	2	32	104.34	1,705.60	165.60	8.70	32.84	2.09	19.78	1.87	0.19
16	7.47	1.84	3	ND	66.74	16,592.80	162.20	569.08	37.06	0.24	4.84	0.35	ND
17	6.29	4.45	2	12	180.28	2,738.80	475.20	198.14	91.88	7.33	24.08	2.82	0.76
18	6.18	3.31	2	29	45.10	494.00	50.80	116.76	21.09	2.20	10.22	2.48	0.12

Results of analysis in 2015 indicate that the soil samples range from slightly acidic to neutral (pH 5.62-7.47). Pit 3 (Sampiniton), 7 and 11 (Narra) have the highest organic matter at 6.86% while Pit 14 (Madaya) had the lowest at 0.90%. Most of the soil samples had very low potassium and phosphorous content but high sulfur and magnesium content. All four elements are essential for plant growth. All sample pits had high to very high manganese levels. Copper, iron and zinc content ranged from low to very levels while boron levels were very low to low.

In December 5, 2012, M&S Company conducted soil profiling survey in 20 project sites. Results are presented in **Table 2-5** below.

*Table 1-12. Results of Analysis for Soil Samples, Survey Conducted on  
December 5, 2012*

P i t	Project Site/ Year Established		%	m eq	Parts Per Million (PPM)										
		p H	O M	Al	P	S	K	Ca	Mg	Na	Mn	Zn	Fe	C u	B
1	Guimaras Blk 1	7.19	4.28	0.161	18	23	342	5,954	450.4	88.71	46.84	7.13	9.61	1.14	2.25
2	Guimaras Blk 2	5.62	4.31	0.161	1	13	149	2,101	397.1	63.75	45.32	1.82	20.91	1.97	2.46
3	Nursery Site	5.23	4.47	0.535	4	21	119	1,694	291.7	81.87	24.65	1.35	23.62	2.16	1.48
4	Gumana	5.32	4.74	0.054	2	12	150	1,376	250.1	65.99	31.52	2.00	24.25	2.01	1.90
5	Granary Rancho 2007	5.55	4.74	0.054	15	14	394	5,799	725.2	140.73	153.75	5.35	10.11	1.55	1.34
6	Simsimon	5.65	5.19	0.107	6	19	182	1,924	312.8	73.72	42.94	1.89	26.81	3.04	2.39
7	Granary 2000	6.42	5.23	0.107	8	23	269	4,196	428.2	75.77	36.48	2.28	9.64	1.40	2.96
8	Granary 2008	5.72	5.07	0.107	22	22	324	3,291	379.4	88.00	81.75	3.90	23.79	1.79	2.25
9	Pela	6.08	5.23	0.214	3	20	451	2,940	524.2	62.73	40.51	3.89	25.28	1.45	1.69
10	Farmlot 2008	5.61	5.07	0.107	6	14	235	4,437	695.8	76.24	48.04	1.94	30.16	1.39	2.18
11	Ecunas 2008	5.88	4.70	0.054	11	20	424	4,274	585.6	60.53	51.50	2.78	32.01	1.31	2.25
12	Mangium 2009	5.63	5.23	0.054	9	15	238	3,088	424.7	44.01	69.30	7.56	27.92	1.31	2.39
13	Panther	6.25	5.07	N D	19	21	318	3,749	492.1	61.42	63.96	11.30	25.38	1.59	3.73
14	Farmlot 2009	5.52	5.29	0.054	6	18	335	3,843	680.3	70.90	59.12	3.53	25.53	1.56	3.80

1 5	Rojoyor 2001	5. 5 9	4. 3 4	0. 05 4	4 8	1 9 8	15 2. 9	2, 64 0	53 2.0	43. 80	19. 01	1. 38	20 .8 6	2. 0 3	3. 1 7
1 6	Rojoyor 2008	5. 4 0	4. 6 0	0. 64 2	3 0	2 0 0	27 3. 6	2, 78 8	98 1.9	64. 64	29. 72	1. 84	18 .1 0	1. 6 7	2. 3 2
1 7	Zambales 2009	5. 8 8	4. 3 4	0. 53 5	1 1	2 2 3	11 9. 7	2, 09 0	41 1.9	60. 76	24. 34	0. 88	16 .3 5	1. 6 1	1. 6 9
1 8	Canete 2009	5. 6 2	4. 7 3	0. 21 4	3 3	2 5 8	26 2. 8	3, 41 3	69 2.1	61. 96	41. 12	1. 73	18 .3 9	1. 2 8	2. 1 1
1 9	Mangium (Coffee) Vietnam	5. 2 0	5. 1 0	2. 46 1	4 3	1 8 3	41 1. 3	5, 47 3	12 69. 1	71. 17	30. 71	3. 19	25 .6 0	0. 9 8	1. 9 7
2 0	Mangium (Coffee) Nestle Robusta	5. 8 4	4. 6 1	N D	1 0	1 6 3	32 1. 9	2, 78 6	51 5.7	68. 49	49. 44	2. 40	29 .9 8	1. 5 6	2. 1 1

The December 2012 results show that soils in these project site range from strongly acidic to neutral (ph 5.20 - 7.19). Most soils, however, fall within the medium acidic range (ph 5.6 – 6.0). Organic matter content ranges from 4.28% to 5.29%.

Almost all samples had very low to low phosphorus content (1-15 ppm) except for the soil in Guimaras Blk. 1 and Panther which had adequate levels (16-20 ppm) and in Granary 2008 which had high phosphorus content of 22ppm. Except for five sampling sites (Nursery Site, Zambales 2009, Guimaras Blk 2, Gumana, and Rojoyor 2001) which had low potassium content (119.0-152.9 ppm), most of the sites had adequate to very high potassium content (182.4-451.4 ppm). All sites had high sulfur content (>16 ppm) and magnesium content (>150 ppm).

Except for the Zambales 2009 site, all sampling sites had adequate to very high zinc contents. Manganese and boron content ranged from high to very high while copper and iron content ranged from adequate to very high levels among all sampling sites.

#### 1.10.1.4. Terrestrial Ecology

##### A. Vegetative Cover

The dominant vegetation type in the Consolidated Project Area is degraded residual forest (DRF) at 53.8% of the total project area followed by established plantation at 26.5% and brushland/rocky area at 10.4%. Agroforestry areas constitute 4.4% while production residual forest constitute only 2.4%. The remainder are settlement areas. (**Table 2-6** and **Map 2-13**).

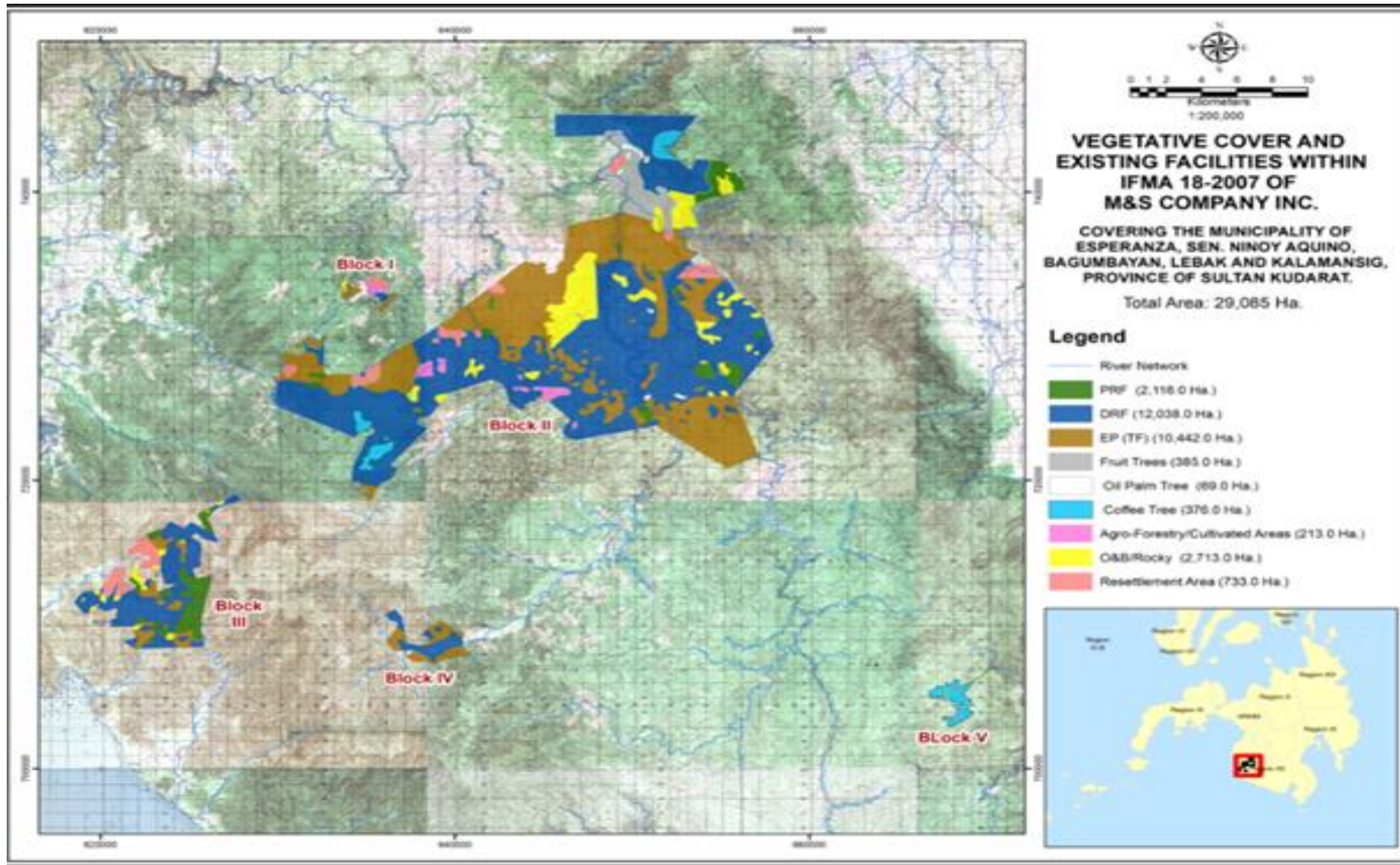
*Table 1-13. Vegetative Cover in the Project Area*

<b>Vegetative Cover/Land Use</b>	<b>Area (Has.)</b>	<b>% to Total</b>
Production Residual forest	687	2.4
Degraded Residual Forest	15,654	53.8
Established Plantation	7,695	26.5
Agroforestry	1,272	4.4
Brushland / Rocky Portion	3,018	10.4
Settlement Areas	759	2.6
<b>Total</b>	<b>29,085</b>	<b>100.0</b>

Species in the production and degraded residual forests include Falcata (*Albizia falcataria*), Yemane (*Gmelina arborea*), *Acacia mangium*, mahogany, and miscellaneous species. Agroforestry species include oil palm, rubber, coffee, durian and other fruit trees.



Map 1-18. Vegetative Cover in the Project Area





## *B. Terrestrial Flora*

### *B.1. Methodology*

A combination of quadrat sampling technique and transect survey was used to assess the terrestrial flora within the vicinity of M & S IFMA area located at Barangays Salumping and Pamintangan, Esperanza, Sultan Kudarat and Brgy. Kuden, Sen.Ninoy Aquino, Sultan Kudarat. The team selected the two (2) quadrats along the transect lines of 2-3 kilometers during the transect walk survey. (**Table 2-7** and **Map 2-14**). The quadrats were distributed in such a way that all existing vegetation cover was represented. Generally, the area has three vegetation types namely; closed forest, open forest and brushland. For trees, individual species with diameter-at-breast height (dbh) or greater than three centimeters inside the 100m x 100m plots were assessed. In addition, 10m x 10m subplots were established for the intermediate growth or plants with dbh less than 3 cm (i.e. poles, saplings) and 5m x 5m subplots for the understorey vegetation (i.e., seedlings, grasses). (see **Photos 2-1** and **2-2**). Information gathered in the field were tabulated and analysed to characterize floral composition within the study area. The relative density, relative dominance and relative frequency values for each tree species were determined to obtain their Importance Value (IV), which is the standard measurement in forest ecology to determine the rank relationships of species. Also, the relative frequency, relative density and relative dominance indicate different aspect of the species importance in a community. Importance values were determined using the following formula:

Density	=	$\frac{\text{number of Individuals}}{\text{area sampled}}$
Relative Density	=	$\frac{\text{density for a species}}{\text{total density for all species}} \times 100$
Frequency	=	$\frac{\text{number of plots in which species occur}}{\text{total number of plots sampled}}$
Relative Frequency	=	$\frac{\text{frequency value for a species}}{\text{total frequency for all species}} \times 100$
Dominance	=	$\frac{\text{basal area or volume for a species}}{\text{area sampled}}$
Relative Dominance	=	$\frac{\text{dominance for a species}}{\text{total dominance for all species}} \times 100$
Importance Value Dominance	=	Relative Density + Relative Frequency + Relative

The diversity indices of the different sampling areas, which include the Shannon index (H) and Evenness index (J), were also computed. The indices were computed using the following formula:

$$\text{Shannon – Weiner Index (H)} = - \sum \left( \frac{ni}{N} \right) \ln \left( \frac{ni}{N} \right)$$

where:

ni = the total number of individuals in each species

N = the total number of all individuals

$$\text{Pielou's Evenness Index (J)} = \frac{H1}{\ln S}$$

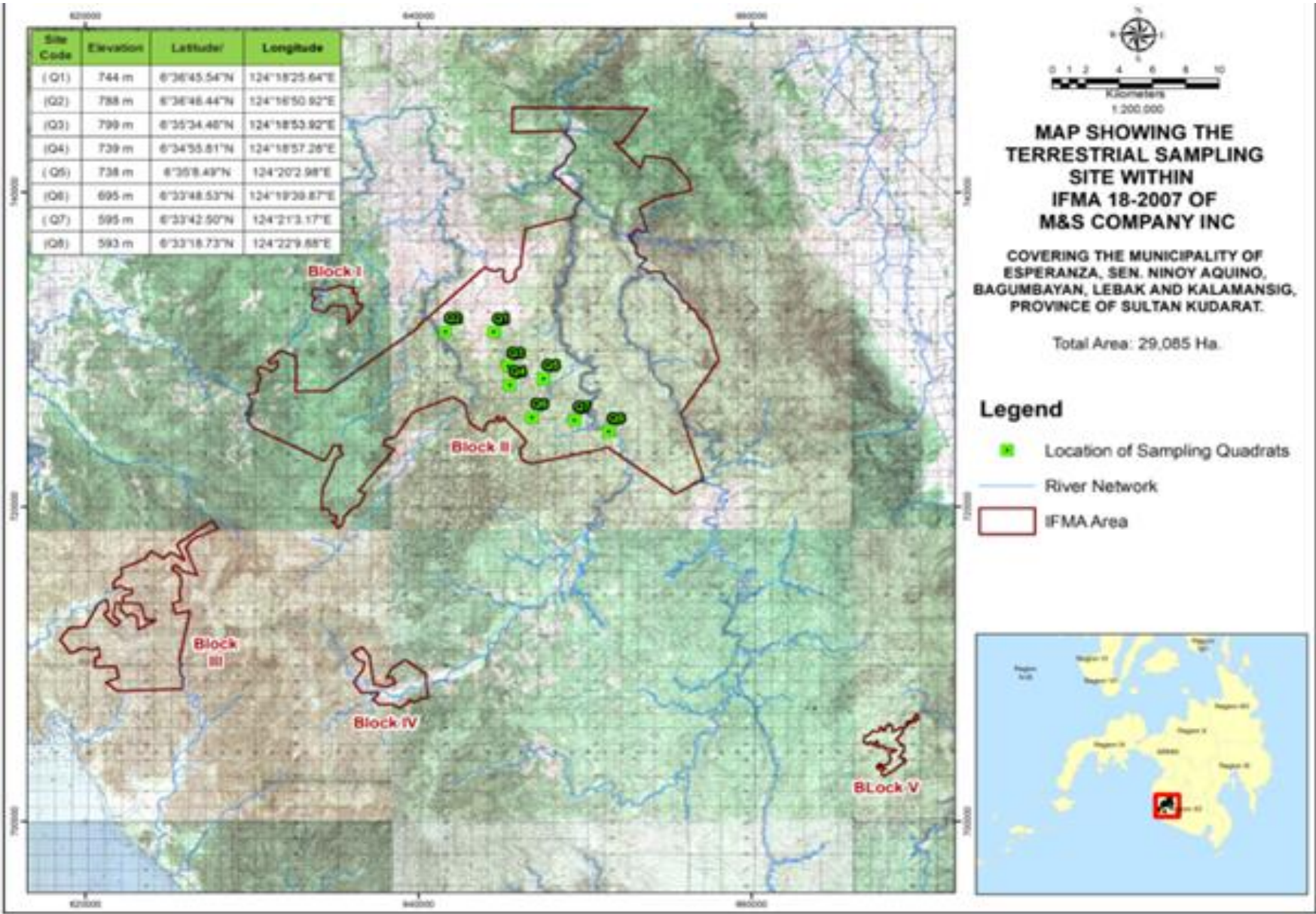
where:

S = total number of species

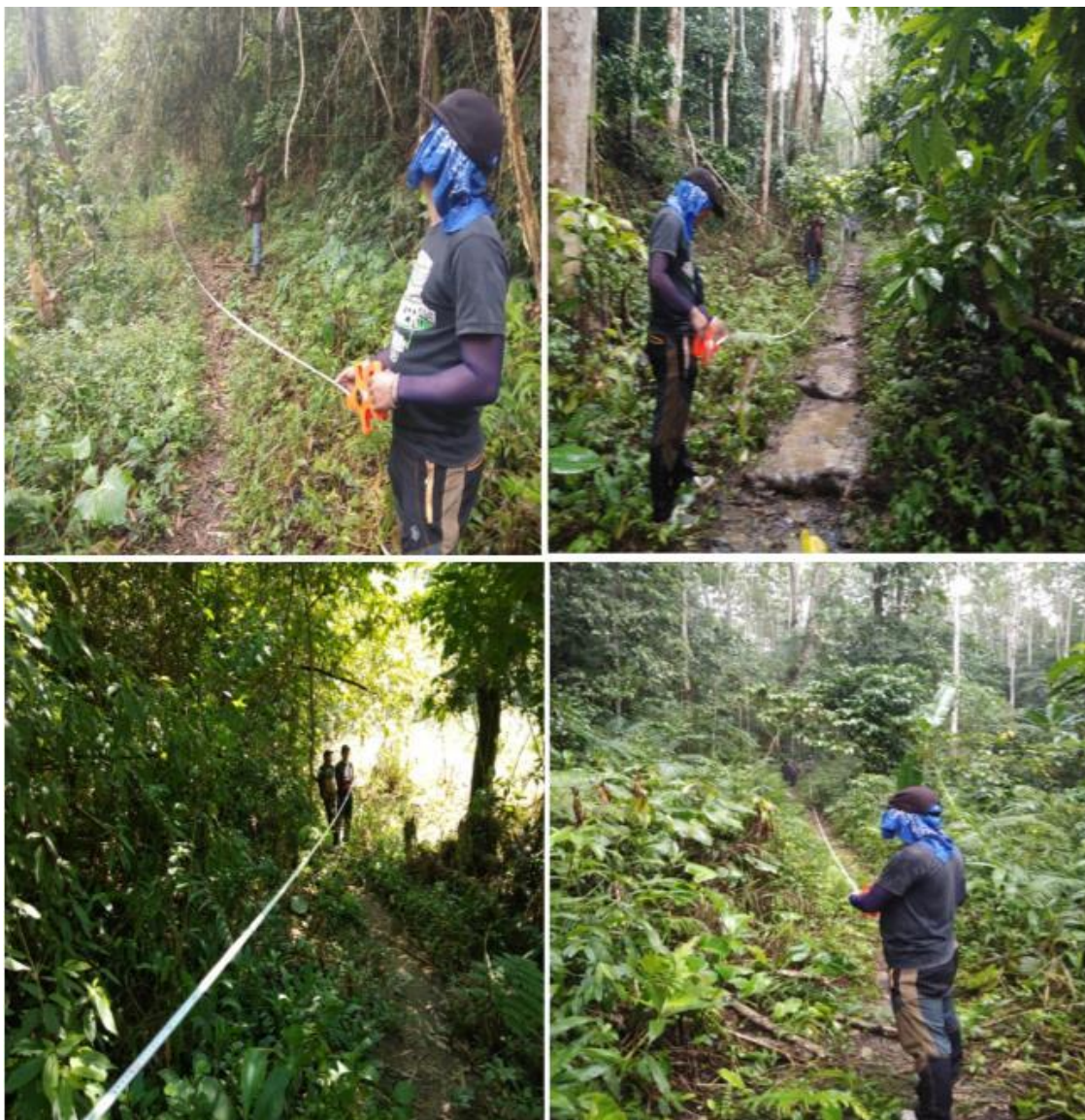
*Table 1-14. Location of terrestrial sampling and observation sites*

Site Code	Name of Sampling/ Observation Sites	Elevation (masl)	Geo Coordinates
			Latitude/Longitude
( Q1)	Lower Omega Area, Brgy. Salumping	744 m	6°36'45.54"N 124°18'25.64"E
(Q2)	Tree Plantation-Omega Area, Brgy. Salumping	788 m	6°36'46.44"N 124°16'50.92"E
(Q3)	Upper Cobra Area, Brgy. Salumping	799 m	6°35'34.46"N 124°18'53.92"E
(Q4)	Bagras Plantation, Cobra Area, Brgy. Salumping	739 m	6°34'55.81"N 124°18'57.28"E
( Q5)	Bravo Camp, Central Nursery, Brgy. Salumping	738 m	6°35'8.49"N 124°20'2.98"E
(Q6)	Upper Bravo Area, Brgy. Salumping	695 m	6°33'48.53"N 124°19'39.87"E
( Q7)	Brgy. Kudin, Sen. Ninoy Aquino, Sultan Kudarat	595 m	6°33'42.50"N 124°21'3.17"E
(Q8)	Along Kulaman River, Brgy. Kuden, Sen. Ninoy Aquino, Sultan Kudarat	593 m	6°33'18.73"N 124°22'9.88"E

Map 1-19. Terrestrial Sampling Map







*Photo 1-3. Photos taken during the establishment of transect lines and quadrats that will serve as the observation points during the conduct of terrestrial assessment in the area.*





*Photo 1-4. Photos taken during the measurement of Diameter at Breast Height (DBH) of trees sighted at the M& S IFMA area.*

**B.2. Results and Discussion****B.2.a. General Situation**

Consolidated IFMA 18-2007 of M & S covering a total of 29,085 hectares is a landscape of rolling terrains, hills, and valleys within the mountain ranges of Mt. Daguma and Alip Range of the Municipalities of Esperanza, Senator Ninoy Aquino, Lebak, Kalamansig, and Bagumbayan all in the Sultan Kudarat province.

Generally, the forest cover of the project area varies from closed-canopy to open canopy forest and some portions of brushlands. The closed-canopy forest are second-growth and residual forest dominated with *Dipterocarpaceae*, *Moraceae*, *Fabaceae*, and *Euphorbiaceae* species. Second-growth forest is moderately dense at the Brgy. Salumping and Margues, Esperanza where the existing tree plantation is located while the residual forest were sporadic and concentrated in the sloping and high elevation areas. The forest floor of the closed-canopy forest has poor undergrowth due to the thick forest litter (e.g. leaves, twigs, branches etc.)

The open forest is relatively young with the highest recorded diameter at breast height (dbh) at only 34 cm; while majority of the individual species have dbh that falls between the ranges of 4 cm to 18 cm. The open portions are brushland which is dominated by ferns such as pako-pako, kilob, and some shrubs and small trees.

Accessible areas specifically outside the IFMA area with existing roads were already open because of illegal logging, timber poaching, kaingin/slash and burn cultivation activities. The forestal area specifically in Esperanza were inhabited by an Indigenous People (IPs) mostly belonging to the Manobo and Tiduray tribes. In fact, these are the pioneers of Esperanza which for many years since time immemorial lived in the area and have been depending on the forestlands for their existence. Land within the vicinity of barangay sites of Brgy. Salumping, Margues, and Pamantingan, Esperanza, Sultan Kudarat were already developed into agricultural land due to influx of people. (**Table 2-8**).

*Table 1-15. Vegetative Cover of M & S IFMA No. 18-2007*

<b>Vegetative Cover</b>	<b>Area (has.)</b>
1.Production Residual Forest	2,116
2.Degraded Residual Forest	12,038
3.Established Tree Plantation	10,442
4.Cultivated/Agroforestry	1,043
5.Bushland/Rocky Area	2,713
6.Resettlement Area	733
<b>Total Area</b>	<b>29,085</b>

**Photos 2-3 to 2-10** show the different types of vegetative cover in the project area.





*Photo 1-5. Quadrat 1 with closed canopy forest established within the tree plantation area of M & S located at Omega Area Brgy. Salumping, Esperanza, Sultan Kudarat*



*Photo 1-6. Panoramic view of the closed canopy to open-canopy forest dominated with *Paraserianthes falcataria*, *Gmelina arborea* and *Dipterocarpaceae* species. The Quadrat 2 was established within the tree plantation of M & S at Omega area.*





*Photo 1-7. Quadrat 3 with closed canopy forest with portions of brushlands along the road located at the Cobra area, Brgy. Salumping, Esperanza, Sultan Kudarat.*



*Photo 1-8. Eucalyptus deglupta tree plantation where the quadrat 4 was established in the Cobra area of M & S IFMA.*





*Photo 1-9. Panoramic view of quadrat 5 located at the proposed Wood /Processing Plant of M & S Bravo area, Brgy. Salumping, Esperanza, Sultan Kudarat with patches of open-canopy forest dominated by dipterocarpaceae, fabaceae and moraceae tree species.*



*Photo 1-10. Panoramic view of quadrat 6 with a portion of closed-canopy forest dominated with dipterocarpaceae species located at the upper portion Bravo Area, Brgy. Salumping.*





*Photo 1-11. Quadrat 7 with portion of closed-canopy to open canopy forest located near the Kulaman River, Brgy. Kuden, Sen. Ninoy Aquino, Sultan Kudarat*



*Photo 1-12. Quadrat 8 with open canopy forest located near the Kulaman River, Brgy. Kuden, Sen. Ninoy Aquino, Sultan Kudarat.*

*B.2.b. Species Composition*

A total of two hundred fifty-one (251) species were recognized belonging to the seed plants, ferns and their allies from the ten quadrats sampled. **Table 2-9** below shows the number of families and species per plant type recorded in the project area.

*Table 1-16. Summary of species composition*

<b>Plant Type</b>	<b>No. of Families</b>	<b>No. of Species</b>
Trees	46	149
Grass/Shrubs/Herbs/Vines	38	80
Ferns/Pterophytes	5	9
Epiphytes/Mosses	3	4
Palms	1	9
<b>Total</b>	<b>93</b>	<b>251</b>

The most speciose (having several species) of all ninety-three (93) families recorded are *Euphorbiaceae* with fifteen (15) followed by *Fabaceae* with thirteen (13) species, *Moraceae* with twelve (12) species and *Dipterocarpaceae* with ten (10) species. Tables **2-10** and **2-11** present the complete list of all the species recorded in the site.

*Table 1-17. List of tree species recorded in M & S IFMA Area, Sultan Kudarat*

<b>Local Common Name</b>	<b>Scientific Name</b>	<b>Family</b>
1 Putian	<i>Alangium meyerii</i>	Alangiaceae
2 Alubijid	<i>Spondias pinnata</i>	Anacardiaceae
3 Mangapaho	<i>Mangifera monandra</i>	Anacardiaceae
4 Pahutan	<i>Mangifera altissima</i>	Anacardiaceae
5 Mangga	<i>Mangifera indica</i> Linn	Anacardiaceae
6 Sangilo	<i>Pistacia chinensis</i>	Anacardiaceae
7 Ilang- ilang	<i>Cananga Odorata</i>	Anonaceae
8 Guyabano	<i>Annona muricate</i>	Anonaceae
9 Batino	<i>Alstonia macrophylla</i>	Apocynaceae
10 Dita	<i>Alstonia scholaris</i>	Apocynaceae
11 Balsa	<i>Alstonia spectabilis</i>	Apocynaceae
12 Lanete	<i>Wrightia laniti</i>	Apocynaceae
13 Malapapaya	<i>Polyscias nodosa</i>	Araliaceae
14 Hagdan Uwak	<i>Oroxylum indicum</i>	Bignoniaceae
15 Banai-banai	<i>Radechmachera pinnata</i>	Bignoniaceae
16 Kapok	<i>Ceiba pentadra</i>	Bombaceae
17 Anonang	<i>Cordia dichotoma</i>	Boraginaceae
18 Tsang Gubat	<i>Ehretia microphylla</i>	Boraginaceae
19 Hanagdong	<i>Trema orientalis</i>	Cannabaceae
20 Bitanghol	<i>Calophyllum blancoi</i>	Clusiaceae
21 Gatas gatas	<i>Garcinia venulosa</i>	Clusiaceae
22 Bitag	<i>Calophyllum inophyllum</i>	Clusiaceae
23 Mangosteen	<i>Garcinia mangostana</i>	Clusiaceae
24 Batuan	<i>Garcinia binucao</i>	Clusiaceae
25 Kalumpit	<i>Terminalia microcarpa</i>	Combretaceae
26 Talisay-gubat	<i>Terminalia foetidissima</i>	Combretaceae
27 Katmon	<i>Dillenia philippinensis</i>	Dilleniaceae
28 Dagang	<i>Anisoptera aurea</i>	Dipterocarpaceae
29 Gisok-gisok	<i>Hopea philippinensis</i>	Dipterocarpaceae
30 Hagakhak	<i>Dipterocarpus Validus</i>	Dipterocarpaceae

Table 2-10,: List of Tree Species, continued

	Local Common Name	Scientific Name	Family
31	Bagtikan	<i>Parashorea malaanonan</i>	Dipterocarpaceae
32	Yakal	<i>Shorea astylosa</i>	Dipterocarpaceae
33	Almon	<i>Shorea almon</i>	Dipterocarpaceae
34	White Lauan	<i>Shorea contorta</i>	Dipterocarpaceae
35	Red Lauan	<i>Shorea negrosensis</i>	Dipterocarpaceae
36	Mayapis	<i>Shorea palosapis</i>	Dipterocarpaceae
37	Tanguile	<i>Shorea polysperma</i>	Dipterocarpaceae
38	Balanti	<i>Homolantus concolor</i>	Euphorbiaceae
39	Gubas	<i>Endospermum peltatum</i>	Euphorbiaceae
40	Binunga	<i>macaranga tanaris</i>	Euphorbiaceae
41	Bignai	<i>Antidesma bunios</i>	Euphorbiaceae
42	Lumbang	<i>Aleurites moluccana</i>	Euphorbiaceae
43	Hamindang	<i>Macaranga bicolor</i>	Euphorbiaceae
44	Tuba-tuba	<i>Jathropa cutcas</i>	Euphorbiaceae
45	Malasantol	<i>Sandoricum vidalii</i> Merr.	Euphorbiaceae
46	Tindalo	<i>Afzelia rhomboidea</i>	Fabaceae
47	Dapdap	<i>Erythrina variegata</i> Linn	Fabaceae
48	Narra	<i>Pterocarpus indicus</i>	Fabaceae
49	Mala-ipil	<i>Afzelia borneensis</i>	Fabaceae
50	Madre de cacao	<i>Glericidia sepium</i>	Fabaceae
51	Banuyo	<i>Wallaceodendron cellibicum</i>	Fabaceae
52	Ipil-ipil	<i>Leucaena leucocephala</i>	Fabaceae
53	Bahai	<i>Ormosia calvensis</i>	Fabaceae
54	Bani	<i>Pongamia pinnata</i>	Fabaceae
55	Mangium	<i>Acacia mangium</i>	Fabaceae
56	Falcata	<i>Paraserianthes falcataria</i>	Fabaceae
57	Rain Tree	<i>Samanea saman</i>	Fabaceae
58	Ulayan/ulaian	<i>Lithocarpus llanoisii</i> (A.DC.) Rehd.	Fagaceae
59	Pangi	<i>Pangium edule</i>	Flacourtiaceae
60	Bago	<i>Gnetum gnemon</i> L.	Gnetaceae
61	Paguringon	<i>Cratogeomys sumatranum</i>	Hypericaceae
62	Lingo-lingo	<i>Viticipremna philippinensis</i>	Lamiaceae
63	Kalingag	<i>Cinnamomum mercadoi</i>	Lauraceae
64	Batikuling	<i>Litsea leytenis</i>	Lauraceae
65	Bohian	<i>Neolitsea villosa</i>	Lauraceae
66	Avocado	<i>Persea gratissima</i>	Lauraceae
67	Tubli	<i>Derris elliptica</i> (Roxb.) Benth.	Leguminosae
68	Himbabalod	<i>Barringtonia acutangula</i>	Lecythidaceae
69	Banaba	<i>Lagerstroemia piriformis</i>	Lythraceae
70	Anilau	<i>Colana serratifolia</i>	Malvaceae
71	Dungon-late	<i>Heritiera littoralis</i>	Malvaceae
72	Malubago	<i>Hibiscus tiliaceus</i>	Malvaceae
73	Durian	<i>Durio zibethinus</i>	Malvaceae
74	Barobo	<i>Diplodiscus paniculatus</i> Turcz	Malvaceae
75	Bitan-ag	<i>Kleinhovia hospita</i>	Malvaceae
76	Banilad	<i>Sterculia comosa</i>	Malvaceae
77	Malabuno	<i>Steculia oblongata</i>	Malvaceae
78	Sayapo	<i>Trichospermum eriopodum</i>	Malvaceae
79	Malatungao	<i>Melastoma polyanthia</i>	Melastomataceae
80	Lanzones	<i>Lansium domesticum</i>	Meliaceae
81	Gmelina	<i>Gmelina arborea</i>	Meliaceae
82	Bagalunga	<i>Melia dubia</i>	Meliaceae

Table 2-10: List of Tree Species, continued

	Local Common Name	Scientific Name	Family
83	Tabigi	<i>Xylocarpus granatum</i>	Meliaceae
84	Kalantas	<i>Toona calantas</i>	Meliaceae
85	Santol	<i>Sandoricum koetjape Merr</i>	Meliaceae
86	Malasantol	<i>Sandoricum vidalli</i>	Meliaceae
87	Colo	<i>Dysoxylum decandrum</i>	Meliaceae
88	Mahogany	<i>Swietenia macrophylla</i>	Meliaceae
89	Ligtang	<i>Anamirta cocculus</i>	Menispermaceae
90	Marang Bangohan	<i>Artocarpus odoratissima blanco</i>	Moraceae
91	Anubing	<i>Artocarpus cumingiana</i>	Moraceae
92	Kamansi/Rimas	<i>Artocarpus communis</i>	Moraceae
93	Himbabao	<i>Alleanthus luzonicus</i>	Moraceae
94	Antipolo	<i>Artocarpus blancoi</i>	Moraceae
95	Nangka	<i>Artocarpus heterophylla lam.</i>	Moraceae
96	Dokdok	<i>Artocarpus marianensis</i>	Moraceae
97	Balete	<i>Ficus balete</i>	Moraceae
98	Malatibig	<i>Ficus congesta</i>	Moraceae
99	Tibig/Tubog	<i>Ficus nota</i>	Moraceae
100	Hagimit	<i>Ficus minahassae</i>	Moraceae
101	Tangisang bayawak	<i>Ficus variegata</i>	Moraceae
102	Malungay	<i>Moringa Oleiferam Lam.</i>	Moringaceae
103	Duguan	<i>Myristica philippinensis</i>	Myristicaceae
104	Guava	<i>Psidium guajava</i>	Myrtaceae
105	Malabayabas	<i>Tristania decorticata</i>	Myrtaceae
106	Sagimsim	<i>Syzygium brevistylum</i>	Myrtaceae
107	Kalubkob	<i>Syzygium calubcob</i>	Myrtaceae
108	Kurasan	<i>Syzygium claviflorum</i>	Myrtaceae
109	Paitan	<i>Syzygium costulatum</i>	Myrtaceae
110	Makopa	<i>Syzygium malaccense</i>	Myrtaceae
111	Makaasim	<i>Syzygium nitidum</i>	Myrtaceae
112	Bagras	<i>Eucalyptus deglupta</i>	Myrtaceae
113	Iba	<i>Averrhoa balimbi</i>	Oxalidaceae
114	Caribbean Pine	<i>Pinus caribaea</i>	Pinaceae
115	Benguet Pine	<i>Pinus kisiya</i>	Pinaceae
116	Buyo-buyo	<i>Piper aduncum</i>	Piperaceae
117	Igem	<i>Podocarpus philippinensis</i>	Podocarpaceae
118	Mansanitas	<i>Ziziphus jujube (Linn.) Lam.</i>	Rhamnaceae
119	Hambabalod	<i>Nauclea formicaria</i>	Rubiaceae
120	Lisak	<i>Neonauclea barthlingii</i>	Rubiaceae
121	Bangkoro/Noni	<i>Morinda citrifolia</i>	Rubiaceae
122	Bangkal	<i>Nuclea orientalis</i>	Rubiaceae
123	Kape	<i>Coffea Arabica Linn.</i>	Rubiaceae
124	Native Coffee	<i>Coffea canephora robusta</i>	Rubiaceae
125	Malakape	<i>Canthium dococum</i>	Rubiaceae
126	Dayap	<i>Citrus aurantifolia</i>	Rutaceae
127	Pomelo	<i>Citrus grandis</i>	Rutaceae
128	Caimito	<i>Chrysophyllum cainito Linn.</i>	Sapotaceae
129	Red Nato	<i>Palaquium luzoniense</i>	Sapotaceae
130	Alupag	<i>Euphoria didyma</i>	Sapindaceae
131	Balit	<i>Erioglossum rubiginosum</i>	Sapindaceae
132	Kusibeng	<i>Sapindus saponaria</i>	Sapindaceae
133	Loktob	<i>Duabanba moluccana</i>	Sonneratiaceae
134	Cacao	<i>Theobroma cacao</i>	Sterculiaceae

Table 2-10: List of Tree Species, end

	Local Common Name	Scientific Name	Family
135	Bayog	<i>Pterospermum acerifolium</i>	Sterculiaceae
136	Dungon	<i>Tarrietia sylavatica</i>	Sterculiaceae
137	Kalumpang	<i>Sterculia foetida</i>	Sterculiaceae
138	Anilaw	<i>Calone serratifolia</i>	Tiliaceae
139	Malibago	<i>Berraya cordifolia</i>	Tiliaceae
140	Aratilis	<i>Muntingia calabura</i> Linn.	Tiliaceae
141	Anabiong	<i>Trema orientalis</i>	Ulmaceae
142	Alagasi	<i>Leucosyke capitellata</i>	Urticaceae
143	Boyon	<i>Mussaenda philippica</i> Merr.	Urticaceae
144	Handamay	<i>Pipturus arborescens</i>	Urticaceae
145	Alingatong	<i>Laportea meyeniana</i> Warb.	Urticaceae
146	Alagau	<i>Prema odorata</i> blancoi	Verbenaceae
147	Kulipapa	<i>Teijsmanniodendron ahernianum</i>	Verbenaceae
148	Tugas/Molave	<i>Vitex parviflora</i>	Verbenaceae
149	Darayawan/Maymagan	<i>Callicarpa erioclana</i>	Verbenaceae

Table 1-18. List of other plants (herbs, ferns, epiphytes, shrubs, grasses, palms, vines) recorded in M & S IFMA Area, Sultan Kudarat

No.	Local Common Name	Scientific Name	Family Name
<b>A. Epiphytes</b>			
1.	Broom Pork Moss	<i>Homalothecium sericeum</i>	Brachytheciaceae
2.	Pocket Moss	<i>Fissidens taxifolius</i>	Fissidentaceae
3.	Ground Orchid	<i>Spathoglottis plicata</i>	Orchidaceae
4.	Wild Waling-waling	<i>Vanda sanderiana</i>	Orchidaceae
<b>B. Pterophytes/Ferns</b>			
1.	Pakong Alakdan	<i>Blechnum oriente</i> L.	Blechnaceae
2.	Pako-pako	<i>Blechnum fraselii</i> L.	Blechnaceae
3.	Tree Fern	<i>Cyathea contaminans</i>	Blechnaceae
4.	Hagnaya	<i>Stenochalaena mitnei</i> Underw.	Blechnaceae
5.	Agsam	<i>Dicranopteris linearis</i> (Burm.f.)	Gleicheniaceae
6.	Kilob	<i>Gleichenia linearis</i> Burm	Gleicheniaceae
7.	Pako	<i>Athyrium esculentum</i>	Polypodiaceae
8.	Bird's nest fern	<i>Asplenium nidus</i> Linn.	Psilotaceae

**Table 2-12** lists the species with highest importance value.

*Table 1-19. List of the recorded tree species with highest Importance Value (IV)*

Rank	Common Name	Scientific Name	Family Name	Importance Value (IV)
1	Falcata	<i>Paraserianthes falcataria</i>	Fabaceae	126.275
2	Balete	<i>Ficus balete</i>	Moraceae	78.078
3	Bagtikan	<i>Parashorea malaanonan</i>	Dipterocarpaceae	67.322
4	Tindalo	<i>Azelia rhomboidea</i>	Fabaceae	58.463
5	White Lauan	<i>Shorea contorta</i>	Dipterocarpaceae	54.548
6	Kalantas	<i>Toona calantas</i>	Meliaceae	50.590
7	Tagisang Bayawak	<i>Ficus variegata</i>	Moraceae	44.944
8	Loktob	<i>Duabanba moluccana</i>	Sonneratiaceae	42.340
9	Bagras	<i>Eucalyptus deglupta</i>	Euphorbiaceae	37.496
10	Dapdap	<i>Erythrina variegata</i> Linn	Fabaceae	33.083
11	Almon	<i>Shorea almon</i>	Dipterocarpaceae	32.151
12	Narra	<i>Pterocarpus indicus</i>	Fabaceae	21.992
13	Buyo-buyo	<i>Piper aduncum</i>	Piperaceae	19.219
14	Mayapis	<i>Shorea palosapis</i>	Dipterocarpaceae	18.026
15	Nato Mindanao	<i>Palaquium mindanaense</i>	Sapotaceae	17.993
16	Sagimsim	<i>Syzygium brevistylum</i>	Myrtaceae	16.032
17	Red Lauan	<i>Shorea negrosensis</i>	Dipterocarpaceae	15.713
18	Gmelina	<i>Gmelina arborea</i>	Meliaceae	15.461
19	Mangium	<i>Acacia mangium</i>	Fabaceae	14.679
20	Colo	<i>Dysoxylum decandrum</i>	Meliaceae	14.375

#### *B.2.c. Diversity Indices*

The diversity of the sampling areas was analyzed using the Shannon-Weiner Index and Pielou's Evenness Index (**Table 2-13**). The Shannon index assumes that individuals are randomly sampled from a large population and that all species are represented in the sample. It gives an estimate of species richness and distribution. The Evenness index is the ratio of the observed diversity to maximum diversity. It is very noticeable that high diversity indices, as well as evenness indices, were recorded from the transect lines/quadrats established in the closed-canopy forest with small patches of open canopy forest in Quadrat 3 located at the Omega area and Quadrat 6 located at upper Bravo area while lower indices were recorded from the brushland and tree plantation area of M & S in (Quadrat 1, 2, and 4). The high indices of the closed-canopy forest are attributed to the relatively intact vegetation cover of the blocks, which had obtained high species richness and abundance compared to the record of the other vegetation types. On the other hand, the low indices of quadrat 5 and 8 validates the poor vegetation cover in the brushland vegetation that are remnant of the previous logging operation of the company.



Table 1-20. Diversity indices and number of species for transect lines/quadrats  
1-8

Sampling Quadrats	Geographical Location	Biodiversity Indices		Number of Individuals
	Latitude/Longitude	Shannon (H)	Evenness (J)	
( Q1)	6°36'45.54"N 124°18'25.64"E	32.31	0.308	124
(Q2)	6°36'46.44"N 124°16'50.92"E	34.84	0.321	131
(Q3)	6°35'34.46"N 124°18'53.92"E	54.45	0.410	208
(Q4)	6°34'55.81"N 124°18'57.28"E	31.23	0.295	116
(Q5)	6°35'8.49"N 124°20'2.98"E	42.30	0.301	68
( Q6)	6°33'48.53"N 124°19'39.87"E	61.20	0.443	228
(Q7)	6°33'42.50"N 124°21'3.17"E	38.18	0.327	92
(Q8)	6°33'18.73"N 124°22'9.88"E	39.12	0.344	67

#### B.2.d. Endemism

Out of the total 251 species identified, there are thirty-eight (38) Philippine endemics (only found in the Philippines) that were found in the sampling sites (**Table 2-14**).

Table 1-21. List of endemic species recorded in M & S IFMA Area, Sultan  
Kudarat

	Local Common Name	Scientific Name	Family
1	Ilang-ilang	<i>Cananga Odorata</i>	Anonaceae
2	Kalumpit	<i>Terminalia microcarpa</i>	Combretaceae
3	Katmon	<i>Dillenia philippinensis</i>	Dilleniaceae
4	Hagakhak	<i>Dipterocarpus validus</i>	Dipterocarpaceae
5	Gisok-gisok	<i>Hopea philippinensis</i>	Dipterocarpaceae
6	Yakal	<i>Shorea astylosa</i>	Dipterocarpaceae
7	White Lauan	<i>Shorea contorta</i>	Dipterocarpaceae
8	Red Lauan	<i>Shorea negrosensis</i>	Dipterocarpaceae
9	Mayapis	<i>Shorea palosapis</i>	Dipterocarpaceae
10	Narra	<i>Pterocarpus indicus</i>	Fabaceae
11	Bitanghol	<i>Callophylum blancoi</i>	Guttiferae
12	Kalingag	<i>Cinnamomum mercadoi</i>	Lauraceae
13	Kalantas	<i>Toona calantas</i>	Meliaceae
14	Malatungao	<i>Melastoma polyanthia</i>	Melastomataceae
15	Balete	<i>Ficus balete</i>	Moraceae
16	Hagimit	<i>Ficus minahassae</i>	Moraceae
17	Tangisang bayawak	<i>Ficus variegata</i>	Moraceae
18	Duguan	<i>Myristica philippinensis</i>	Myristicaceae
19	Nato Mindanao	<i>Palaquium mindanaense</i>	Myrtaceae
20	Malabayabas	<i>Tristania decorticate</i>	Myrtaceae



Table 2-14: List of endemic species, end

	Local Common Name	Scientific Name	Family
21	Igem	<i>Podocarpus philippinensis</i>	Podocarpaceae
22	Hambabalod	<i>Nauclea formicaria</i>	Rubiaceae
23	Loktob	<i>Duabanba moluccana</i>	Sonneratiaceae
24	Dungon	<i>Tarrietia sylavatica</i>	Sterculiaceae
25	Boyon	<i>Mussaenda philippica</i> Merr.	Urticaceae
26	Lingolingo	<i>Vitex turczanonowii</i>	Verbenaceae
27	Kulipapa	<i>Teijsmanniodendron ahernianum</i>	Verbenaceae
28	Tambabasi	<i>Callicarpa formosana</i> Rolfe	Verbenaceae
29	Nito	<i>Lagodium circinnatum</i>	Schizaeaceae
30	Pugahan	<i>Caryota cumingii</i> Lodd.	Palmae
31	Rattan (Palasan)	<i>Calamus merrillii</i> Becc.	Palmae
32	Buri	<i>Corypha utan</i> Lamk.	Palmae
33	Limuran	<i>Calamus ornatus</i> Blume	Palmae
34	Freycinetia	<i>Freycinetia auriculata</i> Merr.	Pandaceae
35	Hantutuknaw	<i>Melastoma malabathricum</i> L.	Melastomataceae
36	Ligas	<i>Semecarpus cuneiformis</i> Blanco	Anacardiaceae
37	Tree fern/Anotong	<i>Cyathea contaminans</i> (Hook.)	Cyatheaceae
38	Molave/Tugas	<i>Vitex parviflora</i>	Verbenaceae

#### B.2.e. Conservation Status

The conservation status of species is based on the DAO No. 2017-11 better known as ‘*The National List of Threatened Philippine Plants and their Categories*’. From the 251 identified species in the eight sampling quadrats, only twenty-five (25) species are included in the National Red List (Table 215).

Table 1-22. List of identified threatened plants found in the project area

No	Common Name	Scientific Name	Family Name	Conservation Status (DAO No. 2017-11)	Location
1	Gisok-gisok	<i>Hopea philippinensis</i>	Dipterocarpaceae	Critically Endangered	Quadrat 3, 5
2	Yakal	<i>Shorea Astylosa</i>	Dipterocarpaceae	Critically Endangered	Quadrat 3
3	Tree Fern	<i>Cyathea contaminans</i>	Cyatheaceae	Endangered	Quadrat 1,2,3,5,6,8
4	Tindalo	<i>Afzelia rhomboidea</i>	Fabaceae	Endangered	Quadrat 5,6
5	Igem	<i>Podocarpus philippinensis</i>	Podocarpaceae	Endangered	Quadrat 5,6
6	Molave	<i>Vitex parviflora</i>	Verbenaceae	Endangered	Quadrat 4,5
7	Narra	<i>Pterocarpus indicus</i>	Fabaceae	Vulnerable	Quadrat 5,6
8	Katmon	<i>Dillenia philippinensis</i>	Dilleniaceae	Vulnerable	Quadrat 3, 7
9	Almon	<i>Shorea almon</i>	Dipterocarpaceae	Vulnerable	Quadrat 8
10	Bagtikan	<i>Parashorea malaanonan</i>	Dipterocarpaceae	Vulnerable	Quadrat 2,3,4,5,6,7

Table 2-15: List of identified threatened plants, end

No	Common Name	Scientific Name	Family Name	Conservation Status (DAO No. 2017-11)	Location
11	White Lauan	<i>Shorea contorta</i>	Dipterocarpaceae	Vulnerable	Quadrat 3,5,6, 7
12	Red Lauan	<i>Shorea negrensis</i>	Dipterocarpaceae	Vulnerable	Quadrat 3, 7
13	Taguile	<i>Shorea polysperma</i>	Dipterocarpaceae	Vulnerable	Quadrat 7
14	Anibong	<i>Oncosperma tigilarium</i>	Arecaceae	Vulnerable	Quadrat 3,6,7
15	Pahunan	<i>Mangifera monandra</i>	Anacardiaceae	Vulnerable	Quadrat 2
16	Antipolo	<i>Artocarpus blancoi</i>	Moraceae	Vulnerable	Quadrat 1, 2, 6
17	Badiang	<i>Alocasia macrorrhiza</i> L. Schott	Araceae	Vulnerable	Quadrat 2,5,6,7
18	Kalantas	<i>Toona calantas</i>	Meliaceae	Vulnerable	Quadrat 5,6
19	Banuyo	<i>Wallaceodendron cellibicum</i>	Fabaceae	Vulnerable	Quadrat 3
20	Malabayabas	<i>Tristania decorticata</i>	Myrtaceae	Vulnerable	Quadrat 3, 6
21	Alupag	<i>Euphoria didyma</i>	Sapindaceae	Vulnerable	Quadrat 3, 7
22	Palasan	<i>Calamus merrillii</i> Becc.	Arecaceae	Other Threatened Species	Quadrat 1, 2,3, 5, 7
23	Limuran	<i>Calamus ornatus</i> Blume	Arecaceae	Other Threatened Species	Quadrat 3, 7
24	Kalingag	<i>Cinnamomum mercadoi</i>	Lauraceae	Other Threatened Species	Quadrat 5, 6
25	Duguan	<i>Myristica philippinensis</i>	Myristicaceae	Other Threatened Species	Quadrat 5, 6

#### B.2.f. Economic and Ecological Significance of Flora Resources

The floral resources identified during the conduct of transect walk and assessment within the study area have significant values to the community. Their uses can be classified into two: 1.) Economic and 2.) Ecological.

Basically, all these resources have ecological roles not only in the specific habitat where they abound but also in nature. Any of these resources which help alleviate economic conditions have economic use.

Economically important species are those used for timber, construction, cottage industry, food, medicine, fiber, feed (forage/pasture), and fuel. Ecologically important species are those ornamentals, landscape plants, hedges, and other plant resources used for soil erosion and weed

control. As a whole the flora resources that includes all plant types such as trees, palms, ferns, shrubs, grasses, vines, herbs etc. is very vital to mitigate the worldwide problem on climate change.

### *C. Terrestrial Fauna*

#### *C.1. Methodology*

The ecological assessment of the terrestrial vertebrate in M & S IFMA was done through opportunistic survey to determine whether the surrounding area of the proposed project supports valuable terrestrial vertebrate fauna communities that will potentially be impacted by the project. The exploration focused on forest animals group namely (i)birds, (ii)frogs and reptiles, (iii)bats (or flying mammals), and (iv) non-volant mammals which belong to a group called “vertebrates” or animal with backbones. Interviews were also performed but were limited only to conspicuous and easily identifiable species (e.g. birds, monitor lizard, snake, insects, etc.). Using the most common metrics such a species richness, Shannon diversity, dominance, evenness and relative abundance were described. Global conservation status of the species was also presented.

#### *C.1.a. Field Survey*

A specific team is responsible for each animal group. Each team is comprised by a Biologists who acted as a field researcher and one local researcher. The local researchers / laborers were at first oriented to the rationale of the activity and the specific objectives of the field expedition and the modified method for each of the four animal groups was discussed. The co-researchers were then assigned to assists in the field assessment for each fauna groups. Species identification was aided using specific fauna keys such as Strange, 2000 for birds Ingle, N.R. and L.R. Heaney (1992) for bats, Heaney *et. al.*, 1999 for non-flying mammals Diesmos *et.al.*, 2015 for amphibians and Brown *et.al.*, 2000 and McLeod *et. al.*, 2011 for reptiles. Journals and materials in the worldwide web also aided in the identification of species.

#### *C.1.a.i. Birds Survey*

All of the birds that were perceived visually or detected through calls within 30 m of the observer were counted. The researchers walked at a slow and constant speed to ensure proper, non-biased observations. DSLR cameras and photographic field guides were used to confirm the observations. All observations were recorded on the field. Nocturnal birds or those active at night were also noted when encountered or heard during the transect walk for nocturnal mammals. The observed birds were identified based on their morphology, behavior and calls according to Kennedy (2000) and Fisher and Hicks (2006). The ecological status, i.e., endemism, of the identified birds was determined using the same field guides. Conservation status was determined using the data provided by the International Union for the Conservation of Nature (IUCN 2014), and the published literature and field guides were used to determine the feeding guilds of the identified species. Birds were listed following the four techniques discussed below:

- c. **Survey using mist nets.** This technique employs specialized nets called “mist nets” to catch flying bird. Each net was set along suspected or ideal flyways (across and along waterways, forest edges and clearings, feeding trees and near forest canopy) to catch birds that happen to pass in the area. Checking was done regularly every 30 minutes especially late afternoon and the birds trapped are immediately removed from the nets to prevent them from getting stressed and eventually die. Birds captured are kept in clean cloth bags and kept in a cool, ventilated place if not processed immediately. For each bird captured, morphometric was measured by a caliper. After taking photos of a few individuals for each captured species, birds were marked with red nail polish to avoid recounting if captured after released.
- d. **Line transect survey.** Transect walk follows the established foot trail along riparian zone, open and cultivated area, forest edges and interior. The transect walks were conducted

in the morning at 0500 hrs and in the afternoon at 1600 hrs where bird activities are assumed to be highest and extended up to 1900 hrs to take into account nocturnal species. A hand-held Global Positioning System was used for the coordinates of each sampling point. All birds seen and heard from both sides of the transect line were recorded. Information such as the mode of observation, weather, habitat type, species, number of individuals, and the stratum where the bird was seen were recorded. Key informant interviews of the local residents were also made to enhance the data gathering.

- e. **Opportunistic listing.** This technique simply means listing all birds that were seen casually around the forests. Such random instances may be during hikes from and back to camp, when transects were being established, during vegetation sampling, and during raptor observations, among others.
- f. **“Sit and Wait”.** The technique is effective in observing and identification of displaying raptors or birds-of-prey such as eagles, harriers, hawks and kites. This is also utilized in taking photographs of shy birds species where the researchers sit and wait while partially hidden in a bush waiting for a good view of to be photo-captured birds. This technique is aided with a pair of binoculars and a telephoto camera.

#### C.1.a.ii. Bat (Flying Mammals)

The technique utilized specialized nets called “mist nets” set along suspected or ideal flyways (across and along waterways, forest edges and clearings, feeding trees and near forest canopy) to catch bats. The mono filament net will appear invisible from afar. Each net measuring 6 m x 12m was installed either individually or in series in areas that were accessible for checking. Nets were left open during the night and field researchers kept watch over the nets during the first two hours of the evening to retrieve “microbat” or insect-feeding bats netted. These groups of bats have very sharp teeth so that if left entangled, they will chew the way out of the nets. Other groups of bats, “megabats” have blunt teeth and are active the whole night feeding on fruits. These groups including a few larger microbats retrieved early the following day were hanged on suitable, shaded areas in the forest after measurements and identification. Bats identification was made possible through the bat field identification guide (Ingle et al, 1992). Measurements such as (i) forearm length, (ii) ear length, (iii) hind foot length, (iv) tail length and (v) total length were done using a caliper. Weight was also measured using a Pesola spring balance. Digital photos were taken and compiled for each captured individual indicating the picture and species ID number in the data sheet. Prior to the release of all captured bats, sugar solutions were given through a dropper to replenish the energy lost during the periods of handling. Red nail polish was used to mark the nails of the captured animals to avoid recounting.

#### C.1.a.iii. Volant mammals (Non-flying mammals)

This includes all other land mammals divided into (i) nocturnal, arboreal mammals, (ii) rodents and shrews, and (iii) other large mammals. The survey methods employed for each of these sub-groups includes:

- a. **Nocturnal, arboreal mammals (Flying Lemur, Civets, and Flying squirrels).** Same transect line used for birds. A team at least three personnel walked the 2km transect and searched for arboreal mammals across all levels of the forests. Researcher also noted (i) the time an animal was detected, (ii) its position in the forest, (iii) its approximate distance from the observer, and the (iv) point along the transect to which it was closest. Maturity of this kind of mammals were also recognized. Transect walk was done during the first three hours of the evening when animal activity was at its peak.
- b. **Rats, squirrels and shrews.** Live traps were used to survey forest rats, shrews and squirrels. Traps were placed in suspected runways, along bushes, rotting logs, root tangles and burrows baited with pieces of half roasted coconuts laced with peanut butter. Traps were visited twice each day, once in the early morning and once in the late afternoon to check for captured animals. Captured animals were immediately retrieved for

measurements of external metrics including (i) total length (TL), (ii) body length (BL), (iii) tail length (Tail), (iv) ear length (Ear) and (v) hind foot length. Weight was also noted using a Pesola spring. Identification of the captured animals was aided with field identification key (Ingle and Heaney, 1992).

- c. **Small land mammals.** Opportunistic listing for documenting other large mammals was carried out relying on indirect evidences of its presence such as fecal droppings in palm civets, forest tracks of wild pigs and deers and even pieces of mammal bones and skulls.



*Photo 1-13. MCSi researchers install “snap traps” in the suspected runways.*

#### C.1.a.iv. Amphibians and Reptiles

An opportunistic method was done in collecting samples. The techniques involved establishing 200 m transect in the forest and finding as many as possible on both sides of the line. This line was searched during the day, one in the morning from 9:00am - 11:00am and one in the afternoon from 1:00pm to 3:00pm, the hours when reptilians are active. At night time, frogs were surveyed during the first four hours of the evening. Any animal that was encountered along the way including snakes were captured and documented. With the aid of caliper and measuring tape, morphometric of amphibians and reptiles was measured and recorded.

#### C.1.b. Analysis Method

The species assemblage for each animal group is described using the most common metrics: (i) species richness, (ii) species evenness, (iii) Shannon-Weaver index of diversity and (iv) relative abundance. The report also describes a few species that were identified by the World Conservation Union or IUCN as globally “threatened” species.

Species richness – refers to the cumulative number of recorded species and provides information on the commonness and rarity of species.

Shannon-Weaver Index of Diversity – a diversity index is a mathematical measure that combines species richness and evenness as a measure of diversity. Species diversity was calculated using Shannon information statistics referred as the Shannon-Weaver Index of Diversity ( $H'$ ):

$$H' = \sum_{i=1} (p_i \ln p_i)$$

where:

$S$  = the total number of observed species,

$i$  = the species number, and

$p_i$  = the proportion of individuals of the total sample belonging to the  $i$ th species

The value of Shannon-Weaver Index of Diversity is constrained between 0 to 5. Lower diversity value normally indicates more uniform species relative to the population.

Species evenness – it is the measure of biodiversity which quantifies how equal the community is numerically. It is a measure of the homogeneity of abundances in a sample or a community. The evenness of the avifauna community was calculated using the Pielou's evenness index ( $E$ ):

$$E = H' / H'_{\max}$$

where:

$H'$  = the value derived from Shannon diversity index and

$H'_{\max}$  = the maximum value of  $H'$  calculated as  $H'_{\max} = \ln S$ .

The value of Pielou's evenness index ranges between 0 to 1. higher values of  $E$  means a less variation in communities between species.

Similarities between the vertebrate taxa across sampling points were calculated using the Bray-Curtis Similarity Index and cluster analysis was performed to groups samples with the most similarity. Similarity index and cluster analysis were calculated using the software PAST version 2.17. All indices are computed for rarefied samples or individuals to reduce the bias of comparisons.

Relative abundance for the observed fauna groups were calculated after Ibañez (2010). For birds, this was expressed as the number of birds per 100 birds and calculated by getting the ratio of the total individuals for each species and the total individuals for all the species ( $N$ ), and then multiplied by 100 birds or:

$$RA = \frac{\text{Total no. of individuals seen or heard}}{\text{Total no. of birds seen (or netted)}} \times 100 \text{ birds}$$

Relative abundance per species was measured separately for mist net and transect line data. Not all species were encountered by both techniques so that some species only had one abundance value.

For bats, relative abundance estimates for each species was expressed as the number of bats per 100 net nights, calculated by getting the ratio of the total number of individuals caught per species and the cumulative number of net nights (total number of nets used x the no. of nights nets were opened). The ratio was then multiplied by 100 or:

$$RA = \frac{\text{Total no. of individuals per species}}{\text{Total no. of net nights}} \times 100 \text{ net nights}$$

The relative abundance for rodents and shrews was expressed as the number of rodents and shrews caught per 100 trap nights. This was calculated by getting the ratio of the number of individuals trapped per species and the cumulative number of trap nights (total no. of traps used x the number of nights they were used). The ratio was then multiplied by 100 or:

$$RA = \frac{\text{Total no. of individuals per species} \times 100 \text{ trap nights}}{\text{Total no. of trap nights}}$$

Relative abundance of nocturnal arboreal mammals was expressed as the number of animals detected per 100 hours of transect. This was calculated by getting the ratio of the number of individuals detected for each species and the total number of hours spent for the transect survey. The ratio was then multiplied by 100, or:

$$RA = \frac{\text{Total no. of individuals detected per species} \times 100 \text{ transect hours}}{\text{Total transect hours}}$$

Description of species with conservation priorities identified by the World Conservation or IUCN is provided. Percentage of Philippine endemic species was also calculated. Percent endemism provides a broad evaluation of the importance of the area being a habitat for unique species (Ibañez, 2010).

## C.2. Results and Discussion

### C.2.a. Overall fauna composition, species richness, endemism and conservation status

Result of the sampling survey yielded a total number of 280 species of terrestrial vertebrate fauna. There were 29 species of birds consisting of 2 near threatened, 2 vulnerable, 1 endangered and the rest are listed as least concern. 9 species of mammals are also identified, 7 of which are volant mammals and 2 non-volant mammals. There were 6 species of reptiles, 2 species of amphibians and 29 species of insects that were identified. Thousands of *Pteropus vampyrus* bats were spotted in the area which was dominant among all bat species although it was assessed as near threatened in IUCN 2018-1. This species was hunted by some tribal communities. However, M&S Company was successful in protecting this species. These species roost near the M & S field office at Sitio Plamango, Brgy. Pamantingan.

*Table 1-23. Summary of species richness of terrestrial fauna recorded in the M & S IFMA monitoring survey*

<b>CLASSIFIED FAUNA</b>	<b>Number of Individuals</b>	<b>Number of Species</b>	<b>Shannon H' (Index)</b>	<b>Evenness Index</b>
AVIFAUNA	193	29	2.835	0.59
BATS	53	7	1.584	0.98
NON-VOLANT MAMMALS	4	2	0	1
AMPHIBIANS	17	2	0	1
REPTILES	13	6	1.517	0.91

Observed species of Avifauna were both high in Shannon H' Index (2.835) and Evenness Index (0.59) and  $r=58.54$  (Table 12) which indicates that the area was still diverse in birds and somewhat a home of many species due to its climate and diversity of large trees and different plants. There is no doubt that the area is productive in both fauna and flora which needs to be protected and conserved. Given the limited time allotted for field research, we could only describe the general condition of wildlife and their composition in the study area. Some information was also obtained



through key informant interviews and secondary data available from the previous study conducted in the area.

*Table 1-24. List of animals that were identified through interview of some key informant and local guides in the area.*

Common Name	Local Name	Scientific Name	Endemism and Conservation Status
<b>I. Mammals</b>			
1. Phil. Monkey	Unggoy	<i>Macaca fascicularis</i>	Vulnerable
2. Greater Musky Fruit Bat	Kwaknit	<i>Ptenochirus Jagori</i>	Least Concern
3. Lesser Musky Fruit bat	Kwaknit	<i>Ptenochirus Minor</i>	Least Concern
4. Long-tongue nectar bat	Kwaknit	<i>Macroglossus Minumus</i>	Least Concern
5. Lesser short-nosed fruit bat	Kwaknit	<i>Cynopterus Brachyotis</i>	Least Concern
6. Philippine Dawn Bat	Kwaknit	<i>Eonycteris robusta</i>	Near Threatened
7. Phil. Flying Lemur	Kagwang	<i>Cynocephalus volans</i>	Threatened
8. Phil. Palm Civet	Milo	<i>Paradoxurus philippinensis</i>	Vulnerable
9. Forest Rat	Ilaga	<i>Rattus everetti.</i>	Abundant
10. Phil. Tree Squirrel		<i>Callosciurus sp.</i>	Vulnerable
<b>II. Reptiles</b>			
1. Reticulated Python	Sawa	<i>Paython reticulatus</i>	Abundant
2. Phil. Sailfin Lizard	Ibid	<i>Hydrosaurus pustulatus</i>	Threatened Species
3. Monitor lizard	Halo	<i>Varanus Salvador</i>	Vulnerable
4. Phil. Cobra	Banakon	<i>Naja naja philippinensis</i>	Abundant
5. Gecko	Tuko	<i>Gecko gecko</i>	Abundant
6. Phi. Skink	Tabili	<i>Lamprolepis smaragdina philippinica</i>	Abundant
Flying Lizard	Hambubukag	<i>Draco vlans</i>	Vulnerable
<b>III. Amphibians</b>			
1. Frog	Palaka	<i>Rana magna</i>	Abundant
2. Toad	Bakbak	<i>Bufo marinus</i>	Abundant
3. Forest Tree Frog	Kogat	<i>Rana sp.</i>	Abundant

#### *C.2.b. Endemicity*

In terms of endemism 47% of the species are identified as endemic such as *Spizaetus philippensis*, *Spilornis holospilus*, *Buceros hydrocorax*, *Penelopides panini*, *Ptenochirus jagori*, *Ptenochirus minor*, *Bullimus bagobus Mearns*, *Philautus surdus*, *Draco mindanensis*, and *Hydrosaurus pustulatus* while 53% of the remaining species are listed as resident.

*Table 1-25. List of Endemic species in M & S IFMA with Species Distribution and Conservation Status.*

<b>FAMILY</b>	<b>SPECIES NAME</b>	<b>ENGLISH NAME</b>	<b>CONSERVATION STATUS</b>
<b>AVIFAUNA</b>			
Accipitridae	<i>Spizaetus philippensis</i>	Philippine Hawk Eagle	Vu
	<i>Spilornis holospilus</i>	Philippine serpent eagle	LC
Bucerotidae	<i>Buceros hydrocorax</i>	Rufous Hornbill	NT
	<i>Penelopides panini</i>	Mindanao tarictic hornbill	En
Columbidae	<i>Phapitreron leucotis</i>	White-eared Brown Dove	LC
	<i>Treron vernans</i>	Pink-necked Green-pigeon	LC
Dicaeidae	<i>Dicaeum australe</i>	Red-keeled Flowerpecker	LC
Picidae	<i>Dendrocopos maculatus</i>	Philippine Pygmy Woodpecker	LC
Psittacidae	<i>Trichoglossus johnstoniae</i>	Mindanao lorikeet	NT
Pycnonotidae	<i>Prioniturus platenae</i> Blasius	Blue Racquet- Tail	Vu
	<i>Hypsipetes philippinus</i>	Philippine Bulbul	LC
	<i>Ixos philippinus</i>	Yellowish Bulbul	LC
Timaliidae	<i>Macronus striaticeps</i>	Brown Tit-Babbler	LC
<b>BATS (VOLANT MAMMALS)</b>			
Pteropodidae	<i>Ptenochirus jagori</i>	Great Musky Fruit Bat	LC
	<i>Ptenochirus minor</i>	Lesser Musky Fruit Bat	LC
<b>NON-VOLANT MAMMALS</b>			
Muridae	<i>Bullimus bagobus</i> Mearns	Mindanao Bullimus	LC
<b>AMPHIBIANS</b>			
Rhacophoridae	<i>Philautus surdus</i>	Common Forest Tree Frog	LC
<b>REPTILES</b>			
Agamidae	<i>Draco mindanensis</i>	Mindanao flying dragon	Vu
	<i>Hydrosaurus pustulatus</i>	Philippine sailfin lizard	Vu

**Photos 2-12 to 2-14** show some of the species observed in the study area.



Photo 1-14. Endemic bird species observed within the M & S IFMA station including *Macronus striaticeps*

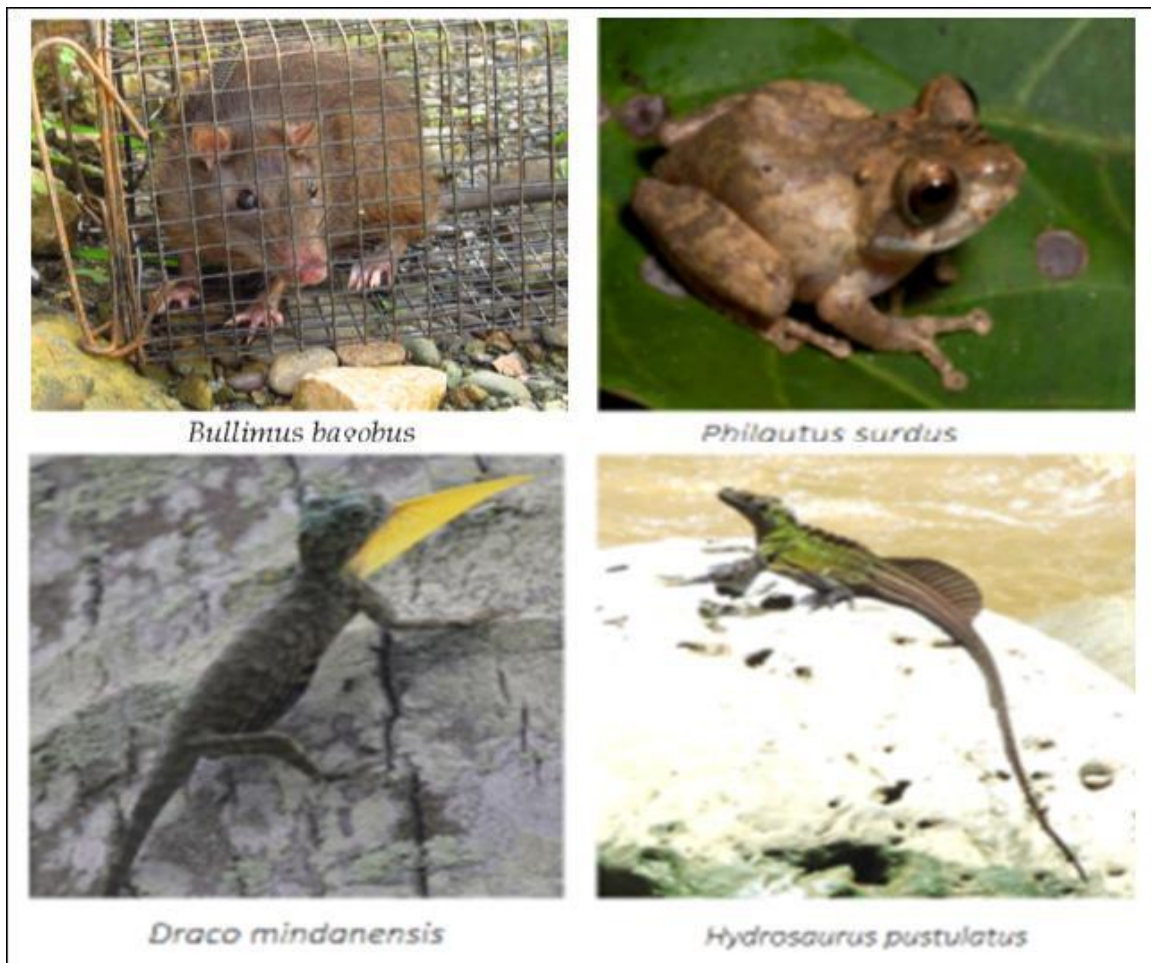


Photo 1-15. Non-flying mammals, amphibians and reptiles within the vicinity of M & S IFMA station.



Photo 1-16. Flying mammals *Ptenochirus jagori* and *Ptenochirus minor* of M & S IFMA station.

**C.2.c. Birds**

**C.2.c.i. Species composition, species richness (r) and abundance (A)**

At least 193 individual species of birds from 18 families were detected in the recent assessment. Abundance of bird were dominated by *Sarcops calvus* which belong to family of Sturnidae and followed by the *Pycnonotus goiavier* in the family Pycnonotidae. Species richness were both high in the two transects: transect 1 with species richness of 80 and transect 2 with 113. The abundance of bird species in the area indicates that these two sites are both productive in vegetation which can satisfy the needs of food variations of different species of birds. Presence of some endemic species such as *Spizaetus philippensis*, *Spilornis holospilus*, *Buceros hydrocorax*, and *Penelopides panini* means that the area is a good roosting site of endangered, near threatened and vulnerable species which needs variant protection.

The list below shows the species richness and relative abundance of the species in the area. The continuous rain throughout the rest of the assessment period might have limited bird activities and affected the observations.

*Table 1-26. Species richness and abundance of birds in the two transect stations.*

Parameters	TRANSECT 1	TRANSECT 2
Species Richness	80	113
Abundance	41.55	58.55

*Table 1-27. Overall Avifauna species that were seen, heard and captured by camera within the area.*

FAMILY	SCIENTIFIC NAME	T1	T2	ALL	R	IUCN
<i>Accipitridae</i>	<i>Spizaetus philippensis</i>	0	1	1	E	VU
	<i>Spilornis holospilus</i> (Vigors, 1831)	0	1	1	E	LC
	<i>Haliastur indus</i>	0	2	2	R	LC
<i>Alcedinidae</i>	<i>Todiramphus chloris</i> (Boddaert, 1783)	0	1	1	R	LC
<i>Bucerotidae</i>	<i>Buceros hydrocorax</i>	2	0	2	E	NT
<i>Bucerotidae</i>	<i>Penelopides panini</i>	0	5	5	E	EN
<i>Columbidae</i>	<i>Phapitreron leucotis</i>	0	4	4	E	LC
	<i>Geopelia striata</i> (Linnaeus, 1766)	0	4	4	R	LC
	<i>Treron vernans</i> (Linnaeus, 1771)	0	1	1	E	LC
<i>Coraciidae</i>	<i>Oriental dollar bird</i>	0	4	4	R	LC
<i>Corvidae</i>	<i>Corvus macrorhynchos</i> Wagler, 1827	1	0	1	R	LC
<i>Dicaeidae</i>	<i>Dicaeum austral</i>	3	2	5	E	LC
	<i>Dicaeum trigonostigma</i>	1	3	4	R	LC
	<i>Arachnothera longirostra</i> (Latham, 1790)	0	4	4	R	LC
<i>Megalaimidae</i>	<i>Psilopogon haemacephalus</i> (Müller, 1776)	6	9	15	R	LC
<i>Meropidae</i>	<i>Merops viridis</i>	0	4	4	R	LC
<i>Nectariniidae</i>	<i>Cinnyris jugularis</i> (Linnaeus, 1766)	3	7	10	R	LC
<i>Oriolidae</i>	<i>Oriolus chinensis</i> Linnaeus, 1766	0	8	8	R	LC
	<i>Passer montanus</i> (Linnaeus, 1758)	14	10	24	R	LC
<i>Picidae</i>	<i>Dendrocopos maculatus</i>	0	1	1	E	LC
<i>Psittacidae</i>	<i>Trichoglossus johnstoniae</i>	0	1	1	E	NT
	<i>Prioniturus platenae</i> Blasius, 1888	0	1	1	E	VU
<i>Pycnonotidae</i>	<i>Pycnonotus goiavier</i>	2	0	2	R	LC
	<i>Ixos philippinus</i> (Forster, 1795)	0	2	2	E	LC
	<i>Hypsipetes philippinus</i>	0	1	1	E	LC



Table 2-20: Overall Avifauna species, end

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>T1</b>	<b>T2</b>	<b>ALL</b>	<b>R</b>	<b>IUCN</b>
<i>Rhipiduridae</i>	<i>Rhipidura javanica</i> (Sparman, 1788)	5	0	5	R	LC
	<i>Spilopelia chinensis</i> (Scopoli, 1786)	0	1	1	R	LC
<i>Sturnidae</i>	<i>Sarcops calvus</i>	0	20	20	NE	LC
<i>Timaliidae</i>	<i>Macronus striaticeps</i>	1	0	1	E	LC



Photo 1-17. Birds captured by cameras within the M & S IFMA area.

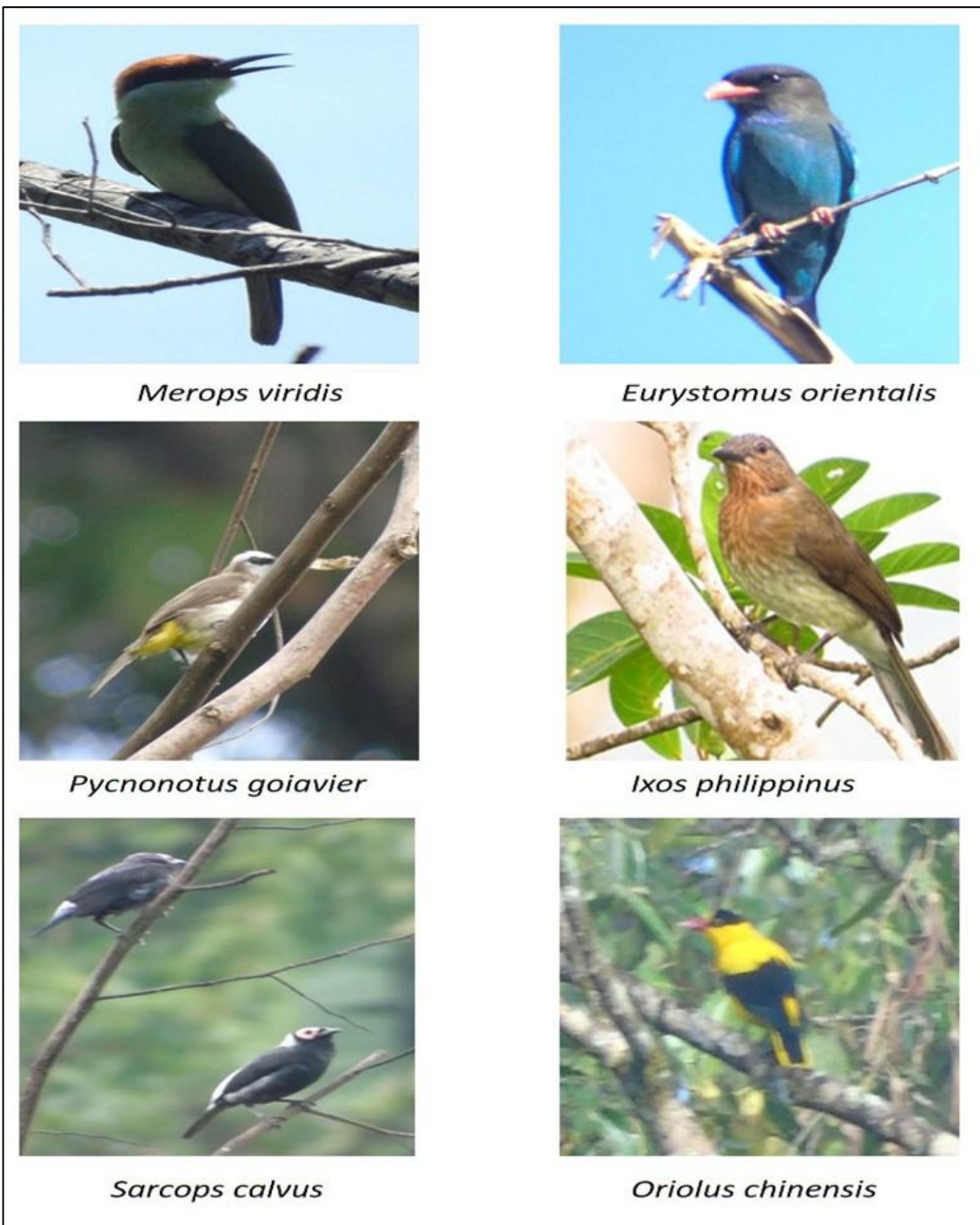


Photo 1-18. Birds captured by cameras within the M & S IFMA area.

#### C.2.c.ii. Conservation Status and Endemicity of birds in M & S IFMA

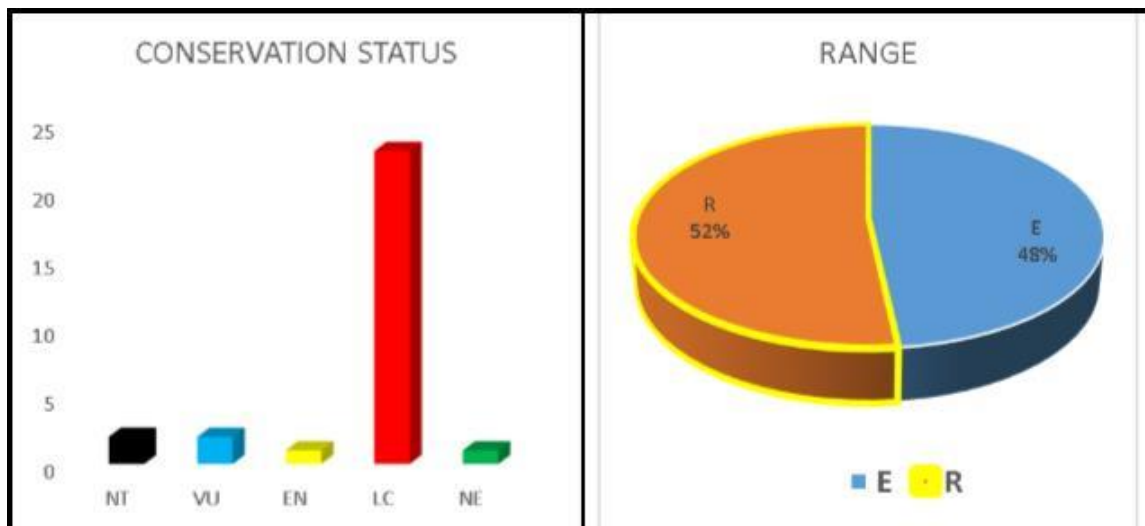
There are two species listed as vulnerable, namely: the Philippine hawk eagle (*Spizaetus philippensis*) and Blue racket tail (*Prioniturus platenae Blasius*). The Mindanao lorikeet (*Trichoglossus johnstoniae*) and Rufous Hornbill (*Buceros hydrocorax*) are listed as near threatened. Moreover, based on the observation of field researchers and local people, Coletto



(*Sarcops calvus*) which is not yet evaluated were considered to be common in the area. The remaining 24 species recorded in the area were listed as least concern. (**Figure 2-1**).

Percentage of endemic species ranges to 48% of the total observed bird species while 52 % are resident. (Figure 2). Even though the numbers of valuable and endemic species are not that high, the area must be protected to restore the remaining numbers so that it can reproduce more species in the future and not be listed as extinct. Identification of conservation status and endemism was based on the IUCN Red List of Threatened Species.

Figure 1-1. Conservation status and endemism of birds observed in the area.



Legend: NT ellipsis (Near threatened), Vu (Vulnerable), En (Endangered), LC (Least concern) and NE (not evaluated). In terms of endemism, E means (endemic) and R is for Resident.

#### C.2.d. Bats (Flying mammals)

##### C.2.d.i. Species composition, species richness (r) and abundance (A)

Bats belong to Order Chiroptera, with 1,001 species. The Order Chiroptera is divided into two suborders - the Megachiroptera (often known as Old World fruit bats) and the Microchiroptera. (Mickleburgh *et al.*, 1992; Hutson *et al.*, 2001). Among all mammals, only bats can fly because they have unique wings that are thin membranes of skin. Bats are the primary predator of many insects that fly at night like mosquitoes, leafhopper, and all agricultural and forest pests. Like human, bats also have their dens (safe places within an animal's territory where it can sleep and rear its family). Insectivorous Microchiroptera (microbats) are dependent on two habitat components for their survival: roost sites and foraging sites. Human activities such as degradation, harvesting of bats for food, disturbance and potential future land-use changes are some of the major threats that affect the natural habitat of bats.

A total of 53 individuals belonging to 7 different species and to one family Pteropodidae were captured. This could be attributed to the presence of the fruiting and flowering plants. High capture rate of bat species in forested area could be explained through food availability within the vicinity since the study was conducted during flowering and fruiting of some fruiting trees in the area. Moreover, *tubog*, which are the best assets to attract bats are present. (See **Photo 1-17** below).



Photo 1-19. Documented moraceae tree species where some of bat species visited for food.

Table 1-28. Diversity of Bats in M & S IFMA area.

Species	Number of Individuals	Relative abundance	Shannon H' (Index)	Evenness Index
<i>Cynopterus brachyotis</i>	16	30.19	0.6365	0.94
<i>Eonycteris robusta</i>	12	22.64	0.6365	0.94
<i>Eonycteris spelaea</i>	5	9.43	0.6730	0.98
<i>Macroglossus minimus</i>	6	11.32	0.6931	1
<i>Ptenochirus jagori</i>	7	13.21	0.6829	0.98
<i>Ptenochirus minor</i>	7	13.21	0.5983	0.90

There is a relatively even distribution of bats ( $r=30.19$ ) in the area. Results of the Shannon H' Index and Evenness Index (**Table 2-22**) indicates that the area is in moderate diversity. Analysis of the results were made using the PAST excel software.

Table 1-29. Distribution status of captured bats in two sampling sites based on the IUCN Red List Guidelines (IUCN Standards and Petitions Subcommittee, 2010).

SPECIES NAME	DISTRIBUTION STATUS
<i>Cynopterus brachyotis</i>	Non-Endemic
<i>Ptenochirus jagori</i>	Philippine Endemic
<i>Eonycteris robusta</i>	Philippine Endemic
<i>Eonycteris spelaea</i>	Non-Endemic
<i>Macroglossus minimus</i>	Non-Endemic
<i>Ptenochirus minor</i>	Philippine Endemic
<i>Pteropus vampyrus</i>	Non-Endemic (Near threatened)

Most of the bat species were identified as least concern except for the *Pteropus vampyrus* which is categorized as near threatened because this species is in significant decline due to being hunted for food. Also, the decline of this species indicates that the foraging sites of these kind of mammals are prone to destructions.



Photo 1-20. Photos of documented bats species captured by mist nets. The seven species belong to only one family Pteropodidae.

The topmost pictures show the Large Flying Fox (*Pteropus vampyrus*) foraging in various large trees near the Kulaman river at Plamango area of M & S IFMA, Brgy. Pamantingan, Esperanza, Sultan Kudarat.

Worldwide studies of bats are important because bats consume vast quantities of insect pests. The health of entire ecosystem is compromised in the absence of bats. People know very little about bats and the need for conservation (Mildenstein *et al.*, 2002).

**C.2.e. Volant mammals**

**C.2.e.i. Species composition, species richness (r) and abundance (A)**

Assessment of non-flying mammals was limited and affected by heavy rains during the conduct of the study. Only one species (*Rattus everetti*) was detected during the sampling period.

*Table 1-30. List of detected non-flying mammals.*

		Range	DAO 2004-15	T1	T2	Total
1	<i>Rattus everetti</i>	R	Least concern	3	1	4
Total Number of species				0	0	1
Total number of individuals				3	1	4
Total Number of endemic				0	0	0
Total number of threatened species				0	0	0

Note: T1 - Transect 1; T2 - Transect 2

**C.2.f. Amphibians**

**C.2.f.i. Species composition, richness and relative abundance**

The recent assessment of amphibians recorded six (6) species from 4 families namely Bufonidae, Dicroglossidae, Rhacophoridae and Ranidae. As shown in Table 19, most of the species recorded belong to the family Dicroglossidae represented by the species *Limnonectes magnus* which is noticeably the most abundant recently (RA=183), *Fejervarya moodiei* with relative abundance of 133 individuals and *Occidozyga laevis* with relative abundance of 33. Family Bufonidae is represented by only one (1) species, *Rhinella marina*, which rank third in terms of abundance. Families Ranidae and Rhacophoridae were also represented with one species each, namely *Hylarana grandocula* and *Polypedates leucomystax*. The species *P. leucomystax* and *O. laevis* have lower abundance.

*Table 1-31. List of detected amphibians.*

		Range	DAO 2004-15	T1	T2	Total
Family Bufonidae						
1	<i>Rhinella marina</i> (Linnaeus, 1758) Cane Toad	R	Not Listed	100	67	167
Family Ceratobatrachidae						
2	<i>Fejervarya moodiei</i> (Dubois and Ohler, 2000) Asian Brackish Frog	E	Not Listed	93	40	133
3	<i>Limnonectes magnus</i> (Stejneger, 1909) Giant Philippine Frog	E	Vulnerable	150	33	183
4	<i>Occidozyga laevis</i> (Günther, 1858) Common Puddle Frog	R	Not Listed	15	18	33
Family Ranidae						
5	<i>Hylarana grandocula</i> (Taylor, 1920) Big-eyed frog	E	Not Listed	57	60	117
Family Rhacophoridae						
6	<i>Polypedates leucomystax</i> (Gravenhorst, 1829) Common Tree Frog	R	Not Listed	16	17	33
Total Number of species				9	4	6
Total number of individuals				431	235	666
Total Number of endemic				3	0	2
Total number of threatened species				2	0	1

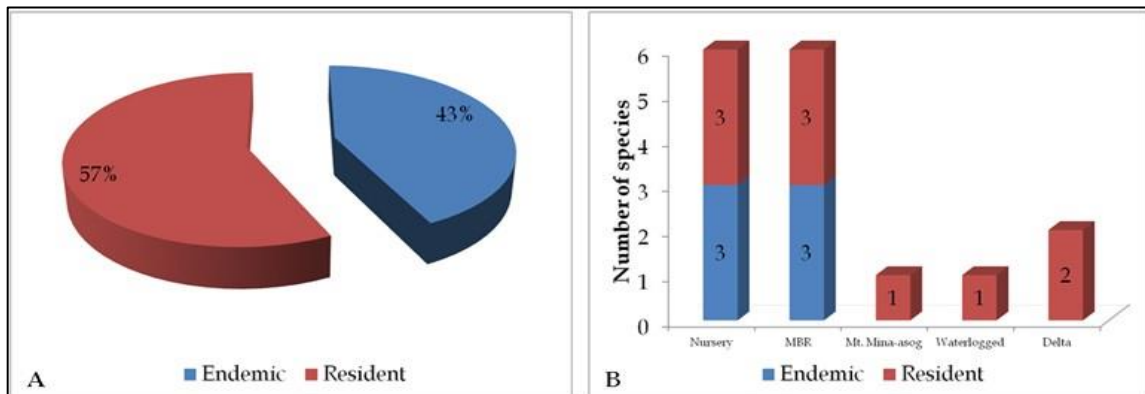


Amphibians were observed at all transects with relatively higher abundance in transect 1. Transect 1 had clearer stream and ground water from the heavy rainfall during the sampling period. Such condition might have favored the occurrence of most of the amphibians in these transect. Since the area is far from disturbed areas, *Limnonectes magnus* is highly dominant in number as it can easily reproduce far away from threats of human activities.

C.2.f.ii. Endemics and conservation status of amphibians

Endemic amphibians constituted only 43% (**Figure 2-2A**). This includes *L. magnus*, *F. moodiei* and *Hylarana grandocula*. The three species were consistently observed along the streams and moist areas of allocated stations. Some species are collected in the riparian zone of the streams.

Figure 1-2. A) Percentage distribution; B) Distribution and abundance of endemic and resident amphibians in the five sampling sites.



The species *L. magnus* fall under the “Vulnerable” classification of DAO 2004-15. The occurrence of this species within the project site was highly pressured not only by the limited microhabitat but also by hunting for food. Intensive information and education campaign has been recommended in previous reports on the area to aid the protection of threatened species including *L. magnus* within the M & S IFMA area. Noticeably, *L. magnus* has higher abundance in the recent assessment which might indicate the recovery of the species aided with a favorable microhabitat resulting from the frequent rainfall. Some photos of the amphibians observed in the area is presented below.

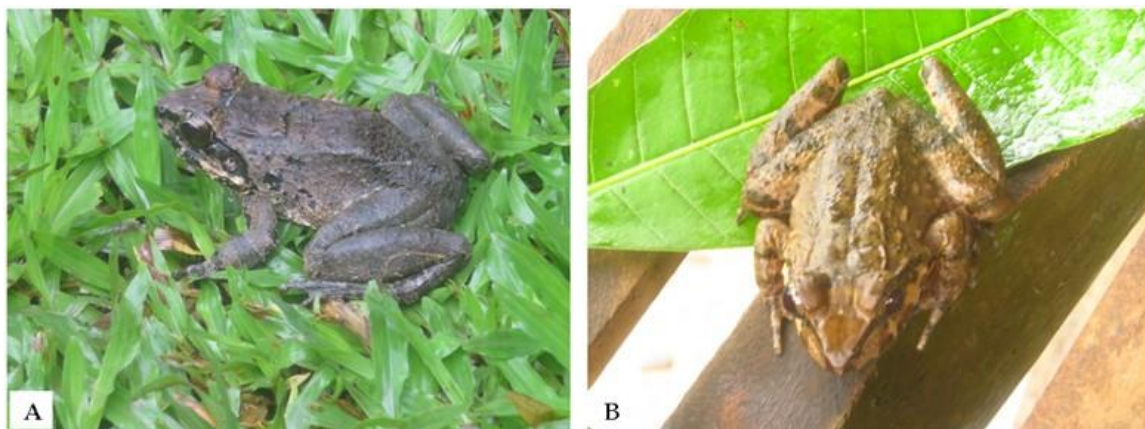


Photo 1-21. Photographs in life of **A)** *Limnonectes magnus* and **B)** *Fejervary moodiei* observed within the M & S IFMA premises.

**C.2.g. Reptiles**

**C.2.g.i. Species composition, richness and relative abundance**

Six species of reptiles from the families Agamidae, Colubridae, Gekkonidae and Scincidae were recorded within the M & S IFMA sampling stations (**Table 2-25**). The family Agamidae was represented by two species, namely: *Hydrosaurus postulatus* and *Draco volans*. *H. postulatus* appeared to be the most abundant reptile in the recent result and was detected only in the transect 1. The species *Eutropis multifasciata* of the family Scincidae was detected mostly in all stations and ranks second in terms of abundance. The family Colubridae was represented by the two species *Ahaetulla prasina preocularis* and *Dendrelapis* sp. The *Phyton reticulate* of the family Pythonidae was also observed.

*Table 1-32. List of reptiles detected in the recent assessment.*

		Range	DAO 2004-15	T1	T2	Total
Family Agamidae						
1	<i>Draco volans</i> (Linnaeus, 1758) Common Flying Dragon	R	Not Listed	50	0	50
2	<i>Hydrosaurus pustulatus</i> (Eschscholtz, 1829) Philippine Sailfin Lizard	E	OTS	83	0	83
Family Colubridae						
3	<i>Ahaetulla prasina preocularis</i> (Taylor, 1922) Asian Vine Snake	R	Not Listed	13	20	33
4	<i>Oxyrhadum modestum</i> Philippine shrub snake	E	Least concern		33	33
Family Pythonidae						
5	<i>Python reticulatus</i> (Linnaeus, 1758) Python	R	Not Listed	17	0	17
Family Scincidae						
6	<i>Eutropis multifasciata</i> (Kuhl, 1820) Common Sun Skink	R	Not Listed	35	32	67
Total Number of species				5	3	6
Total number of individuals				198	85	283
Total Number of endemic				2	0	2
Total number of threatened species				1	0	1

**Note:** OTS=Other Threatened Species; E=Endemic; R=Resident; DD=Data deficient

**C.2.h. Endemics and conservation status of reptiles**

The percentage distribution of endemic reptiles is presented in **Figure 2-3 A and B** while **Photo 2-20** shows some photos of the documented reptiles within M & S IFMA area. Reptile endemism (17%) was low. Some species are yet to be identified such that information on geographic distribution and conservation status is still limited (Data Deficient).



Figure 1-3. A) Range descriptions and B) distribution of the endemic and resident reptiles in the sampling stations M & S IFMA station.

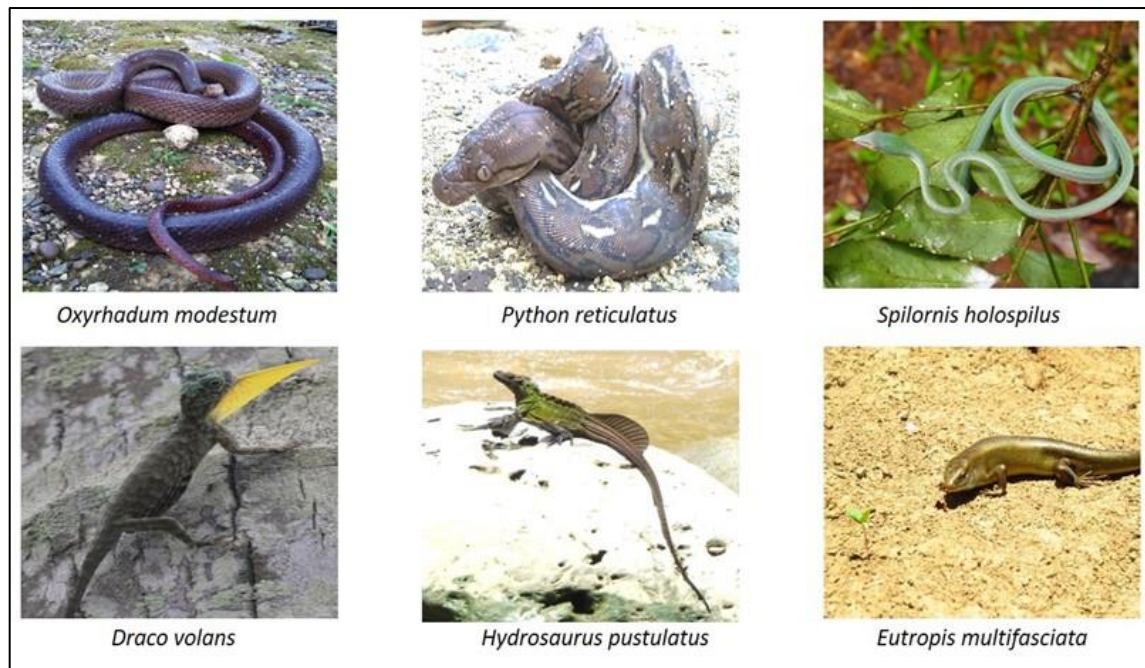
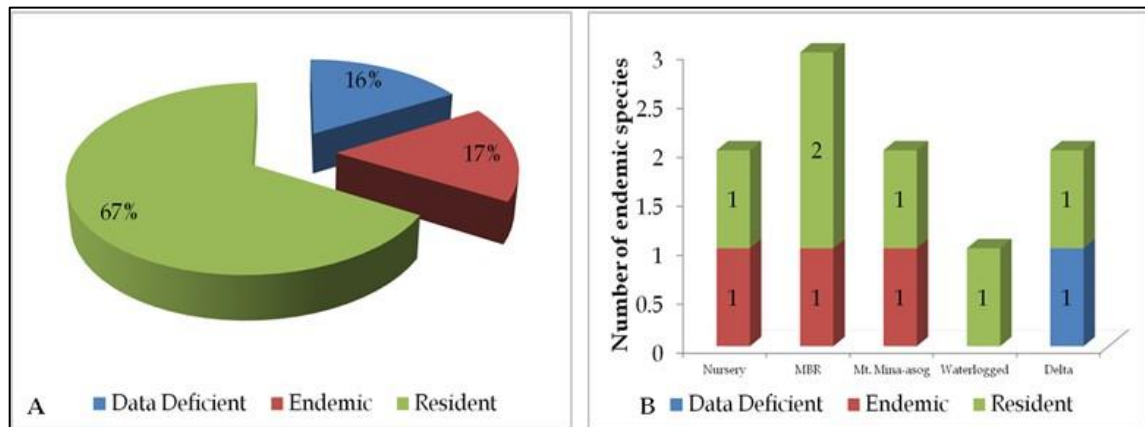


Photo 1-22. Photographs in life of some reptiles that were seen within the M & S IFMA premises.

### C.2.i. Insects

#### C.2.i.i. Composition and Importance

Insects have significant roles in maintaining biotic communities. They serve as pollinators, food for birds, fish and other animals, as predators, as scavengers, and as parasites of harmful insects.

Without insects to help breakdown and dispose of wastes, dead animal and plants would accumulate in our environment and it would be messy indeed.

Insects are underappreciated for their role in the food web. They are the sole food source for many amphibians, reptiles, birds, and mammals.

Twelve (12) insect orders from fifty-eight (58) species were recorded. The most dominant insect species belongs to order Lepidoptera composed of butterflies, moths, and worms.

*Table 1-33. List of Insects/Arthropods and Significance Value in the M & S IFMA area.*

<b>Order/Family</b>	<b>Common Name</b>	<b>Significance (Economic/ Biological/ Cultural Value)</b>
Coleoptera	Leaf beetle	Pest
	Snout beetle	Pest
	Click beetle	Pest
	Firefly	Predator
	Long-horned beetle	Predator
	Bumble bees	Predator
	Tiger Beetle	Predator
	Long horned beetle	Predator
	Black and green spotted weevil	Predator
	Common Rhinoceros Beetle	Ecological function
Hymenoptera	Carpenter bee	Parasite
	Wasp	Pollinator/pest
	Honey bees	Wax/Honey
Lepidoptera	Brush-footed butterflies	Pest
	Milkweed butterflies	Pest
	Saphire Moth	Pest
	Peirine Butterfly	Pest
Diptera	Saprophagous	House flies
	Fruit fly	Saprophagous
Orthoptera	Short-horned grasshopper	Pest
	Crickets	Phytophagous
	Mole cricket	Phytophagous
	Pygmy grasshopper	Pest
	Long-horned grasshopper	Phytophagous
	Glass winged leaf hopper	Phytophagous
Odonata	Dragonfly	Predator
	Damselfly	Predator
	Meadowhawk Dragonfly	Predator
Hemiptera	Assassin bug	Predator
Homoptera	Red ants	Ecological Function/Pest
	Black ants	Ecological Function
Formicidae	Praying mantis	Ecological Function
Mantodea	Termites	Pest
Isoptera	Spider	Predator
	Millipede	Scavenger
	Centipede	Scavenger
	Soft armored crawler	Ecological Function
Other Arthropods		
Arachnids		
Diplopoda		

Results obtained in this fauna assessment provides the partial data of terrestrial vertebrate fauna within the M & S IFMA area for the year 2018. The area is still abundant to most terrestrial species. The heavy rains throughout the assessment periods affected animal activity which also limited the observations. Almost half of the recorded species of birds were less than the result of studies in some areas of Sultan Kudarat.

### ***1.10.2. Impact Assessment***

#### ***1.10.2.1. Pre-Operations***

Nil to minimal impact on land is expected during the pre-operations/pre-construction phase as this mostly includes activities such as stand inventory, research, and planning.

Land use conflict with resident households within the proposed IFMA area is not expected as these have already been addressed in past company operations in the IFMA area. Resettlement sites have been identified and the community people have relocated to these sites. As committed by the company, employment opportunities and livelihood/income-generating projects have been implemented to benefit them. Moreover, the project area does not overlap with ancestral lands or CBFM or other tenured land.

Moreover, the company's development and management schemes are designed to be appropriate for each land use type. For example, forest areas which need protection are protected while areas which need revegetation are revegetated. (See Table 4: Management Scheme per Type of Area).

Esperanza municipal LGU's proposal under its FLUP to put its entire 26,350.67 hectares remaining forest and forestland under a Co-Management Agreement is not in conflict with the company since the protection/production regimes are similar and these are all regulated under PD 705 and other relevant laws and regulations.

#### ***1.10.2.2. Operation Phase***

Activities in the proposed IFMA area during this phase include road construction/rehabilitation and maintenance, nursery management, plantation development and management, reforestation and protection.

##### ***A. Road Rehabilitation***

To improve access to the proposed IFMA Area, the roads will be rehabilitated. These activities will generate dust as well as noxious emissions from the use of dumptrucks and other heavy equipment.

Unless properly controlled, access roads intended only for management and harvesting purposes may expose the forest to unintended uses, such as in-migration; conversion to agriculture, livestock, hunting, and mining; illegal fuelwood extraction and/or charcoal production; and colonization by invasive plant species.

##### ***B. Nursery Management***

Forest nurseries may also be a risk for contamination of ground water if chemicals and pesticides are used. If located near surface water bodies, there is a risk of run-off containing chemicals toxic to aquatic animals.

### *C. Plantation development and management*

Clearing of vegetation will result to the removal of ecologically and economically important species. The destruction of wildlife habitat will result to displacement of wildlife. Stripping of topsoil will consequently disturb the seed bank in the area through seed displacement affecting the ecological recovery of vegetation in the project site. Accelerated soil erosion as a result of clearing and earthworks will contribute to soil nutrient loss necessary for plant growth. Removal of vegetation, top soil, leaf litter, rock crevices, decaying logs, tree stumps, etc. will lead to the complete transformation of the habitat causing displacement and even direct killing of wildlife most especially those that are less mobile (i.e., amphibians, reptiles, small non-volant mammals, nestlings and other young individuals).

Animal skidding where carabaos drag the logs to the log landing generally on designated skid trails can cause disturbance by displacing the ground cover and compacting the mineral soil. Additional disturbance is caused by skidder runners loosening the soil, especially on slopes over 20%.

Field research has found that timber harvesting tends to compact the soil. Compaction increases soil erosion and adversely impacts forest productivity. Most erosion comes from skid trails on timber harvest units because of the reduced infiltration rates and disturbance to the organic layer. The accelerated erosion caused by timber harvesting may result in deterioration of soil physical properties, nutrient loss, and degraded stream water quality from sediment, herbicides, and plant nutrients.

Harvesting trees removes nutrients from the generally nutrient-deficient environment of the IFMA area. Researchers generally agree that shorter rotations and whole-tree harvesting remove more nutrients than can be replaced in a rotation. Harvesting crowns is undesirable because they contain a large portion of the stand nutrient content.

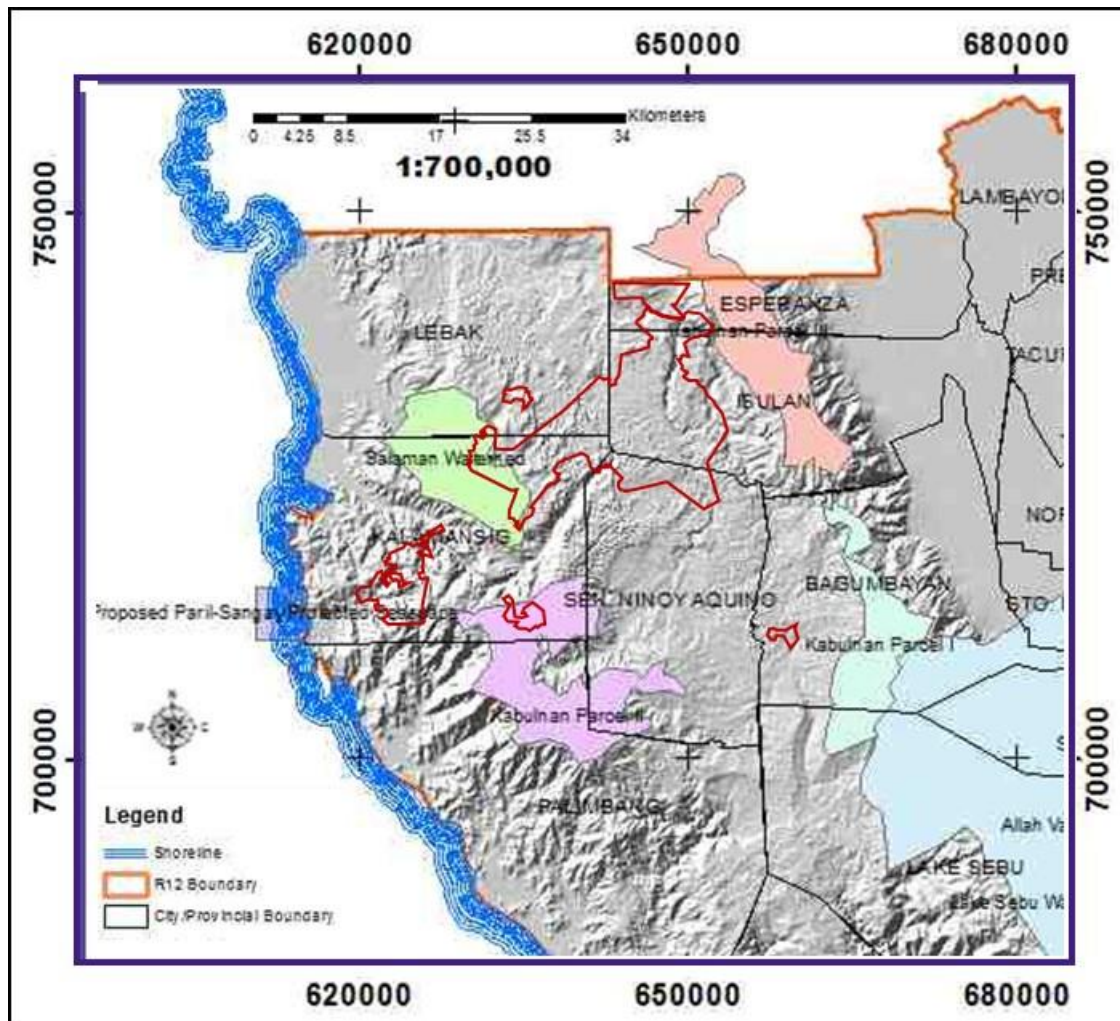
## **1.11. The Water**

### ***1.11.1. Baseline Environmental Conditions***

#### **1.11.1.1. Hydrology/Hydrogeology**

The Project Area straddles portions of the Kabulnan 2 watershed and the Salaman watershed. **(Map 2-15).**

Map 1-20. Watershed Areas



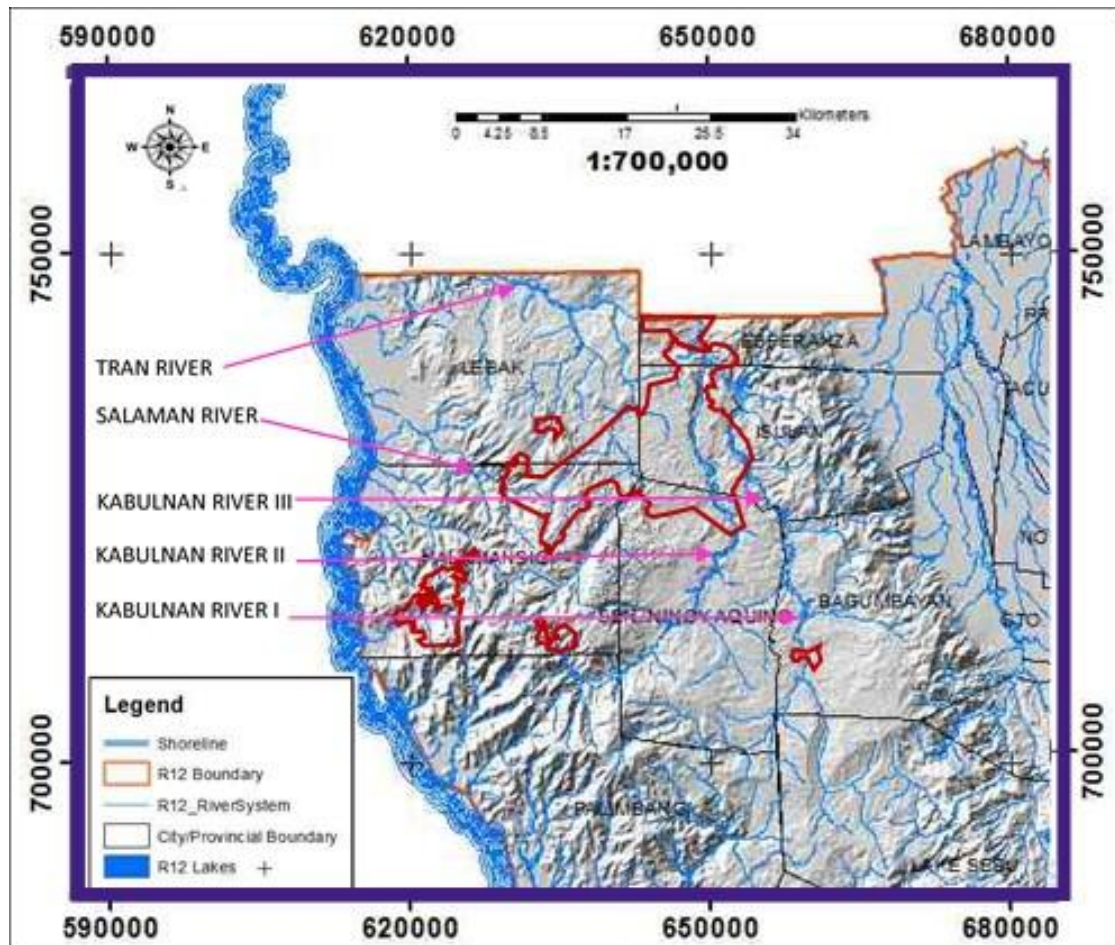
Source: DENR Region 12 [www.r12.dnr.gov.ph](http://www.r12.dnr.gov.ph). Accessed 10/29/18.

Kabulnan-2 has a drainage area of about 498.89 sq.km. (NIA, 2007) while Salaman River has a drainage area of 8,176 hectares (Provincial LGU of Sultan Kudarat, 2010) or 81.76 sq.km..

There are three major river systems running through the IFMA areas: Tran, Salaman, and Kabulnan. These rivers have many tributaries. (**Map 2-16**).



Map 1-21. River Systems



Source: DENR Region 12 [www.r12.denr.gov.ph](http://www.r12.denr.gov.ph). Accessed 10/29/18.

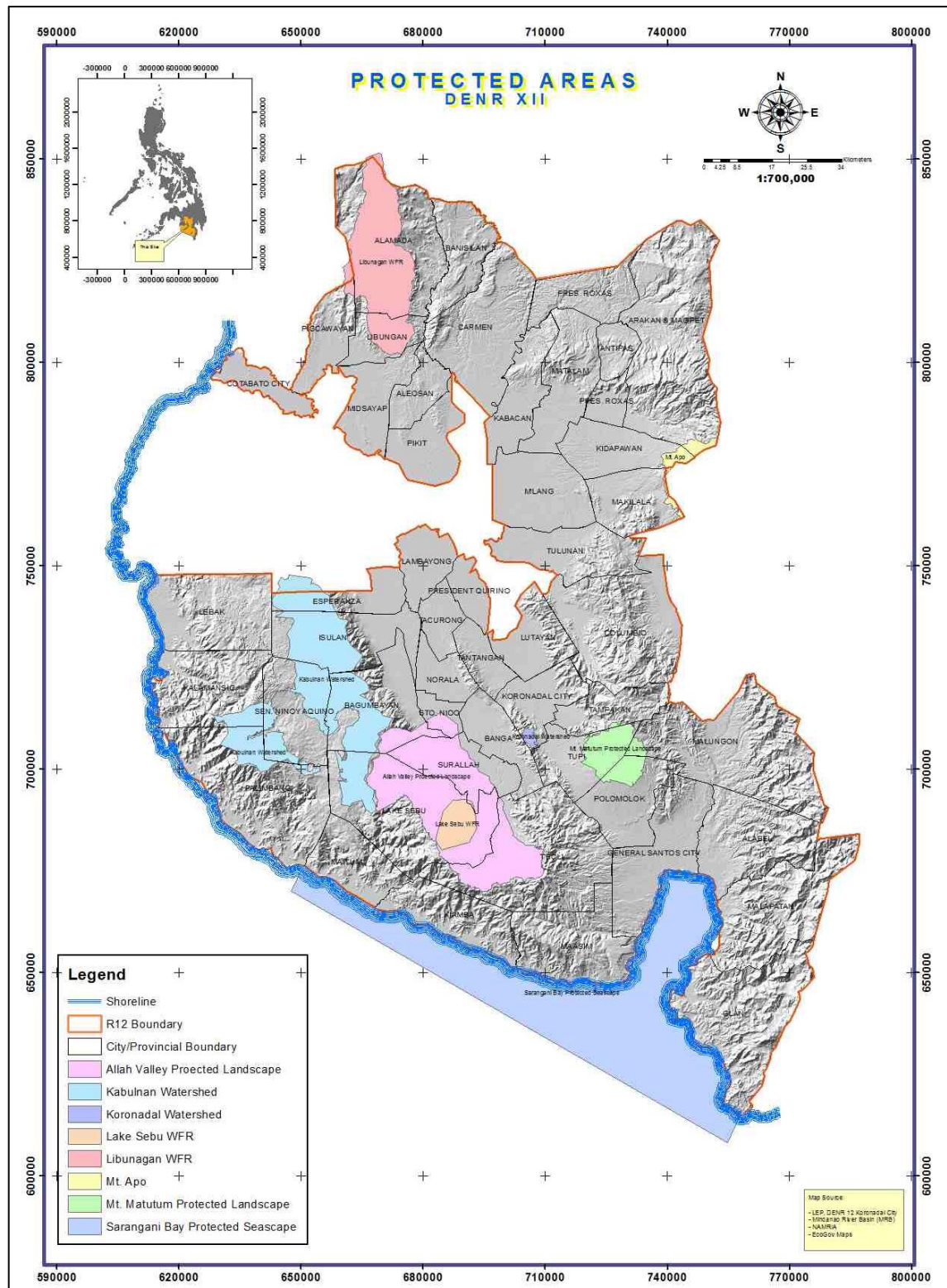
Tran River has its headwaters in the mountains in South Upi, Maguindanao Province. One part runs towards the plains in South Upi while another traverses south crossing the boundary of South Upi and Lebak, Sultan Kudarat and continues west-northwest towards Lebak's coastal plains and empties into the Celebes Sea. A portion of its tributaries run within the consolidated IFMA area.

Salaman River originates from the mountains in Kalamansig, winding west-northwest-west through Kalamansig's coastal plains until it empties into the Celebes Sea. Likewise, a few tributaries have some portions running through the consolidated IFMA area.

Kabulnan River has three major tributaries. Kabulnan-1 traverses the Municipality of Bagumbayan from the north to southeast then southwest. Kabulnan 2 runs south to north from the northern end of Kabulnan-1 passing through the municipality of Isulan then merging with Kabulnan-3 in the northwest portion of Esperanza. The southern portion of Kabulnan 3 is joined by several of its tributaries and runs from the mountains in the southwestern part of SNA veering east towards SNA's fertile valleys and north to join with the northern portion of Kabulnan-3. The northern portion passes through the municipalities of Senator Ninoy Aquino (SNA) and Isulan where it then merges with Kabulnan-2. The merged rivers traverse northeastward to merge with Maganoy River in the Province of Maguindanao.

Salaman watershed is an unproclaimed watershed area while Kabulnan-2 watershed is part of the 116,452-hectare Kabulnan Watershed Forest Reserve (KWFR).

ap 1-22. Protected Areas



Source: DENR Region 12 [www.r12.dnr.gov.ph](http://www.r12.dnr.gov.ph). Accessed 10/29/18.

#### 1.11.1.2. Water Quality

Field surveys included physio-chemical water quality, water sampling and analysis, fish and macroinvertebrate surveys, aquatic vegetation audits and rapid assessment techniques for geomorphological processes. Physio-chemical water quality parameters were assessed in situ using a multiprobe water quality instrument (PASCO Advance Water Quality) and included Ph, water temperature, and Dissolved Oxygen (DO). The assessment methods were consistent with the Effluent Quality Monitoring Manual issued through EMB Memorandum Circular 2008-008 and undertaken by appropriately trained and experienced M&S Company, Inc. personnel. The data have been used to provide a picture of the environmental and ecological conditions at the time of sampling and have been used to interpret the ecological data in context.

Instrumentation was calibrated according to manufacturer specifications before each field event to ensure accuracy and consistency between sampling sites.

The Effluent Quality Monitoring Manual issued through EMB Memorandum Circular 2008-008 sets water quality criteria to protect existing and potential beneficial uses, including water supply for domestic, agriculture, aquaculture, and industrial purposes; recreation; and the growth and propagation of fish and other aquatic life. Table 1, Table 2, and Table 3 present a summary of the numeric water quality

**Physio-chemical test for the surface water conducted for water quality assessment in Cabulanan River, Kulaman River and Tran River.** There were three (3) sampling sites per river: upper/upstream, mid stream and lower/downstream. Sampling site pins are shown in Figures 1,2, and 3 for Cabulanan River, Kulaman River, and Tran River respectively.

Parameters	Unit	DAO 2016-08 Class A River	Upper Cabulanan River	Lower Cabulanan River	Upper Kulaman River	Lower Kulaman River	Upper Tran River	Lower Tran River
Temperature	°C	26-30	27.0	27.2	26.7	27.4	27.3	27.5
pH		6.0-9.0	7.12	6.90	7.43	7.10	8.22	8.53
Dissolved Oxygen	mg/L	5 (min.)	5.23	5.18	8.20	7.16	6.80	6.77
Nitrates	mg/L	-	4.28	5.00	0.40	0.40	0.24	0.16
Phosphates as phosphorus	mg/L	-	<0.004	0.09	<0.004	0.01	0.01	0.04
Biochemical Oxygen Demand	mg/L	5	<1	1	1	1	<1	<1
Oil and Grease	mg/L	1	1	<1	2	<1	<1	<1

Organophosphate	mg/L	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Coliform	MPN Index/ 100 mL	1000	920	920	170	240	540	920

The bacteriological quality of water was sampled in nine locations in rivers and creek last October 24, 2018. Results of the laboratory analysis (**Annex F**) show that the water total coliform and E. coli were very low and well within the threshold limits.

Other sets of water samples were analysed and evaluated based on guidelines indicated in DAO 2016-08 with the following parameters enumerated below:

- pH levels are within the permissible environmental standards.
- Water temperature is well within the Class A waters permissible range.
- DO levels are above the DAO 2016-08 standard
- Nitrates and Phosphates are within the environmental standards for Class A water
- BOD concentration in all sampling sites are low and are all within the Class A waters permissible range.
- Only one sampling site (Upper Kulaman River) exceeded the permissible limit for Oil and Grease content.
- Organophosphate content is within the environmental standards for Class A waters

### ***1.11.2. Impact Assessment***

#### ***1.11.2.1. Pre-Operations Phase***

Water demand for road rehabilitation, which include those used for civil works and those consumed by workers, is deemed minimal and tend to be short term thus there is practically no negative impact on water resources.

#### ***1.11.2.2. Operations Phase***

During the Operations Phase, three major activities are identified which may have an impact on the rivers and creeks in the IFMA Area: forest plantation establishment, timber harvesting and plantation management.

With the forest plantation establishment, siltation is expected to occur during site preparation. The water quality of the rivers and creeks in the area in terms of total suspended solids may be affected. Moreover, the decrease in the number of trees results in a decrease in evapotranspiration, which contributes to increased subsurface flow, streamflow, and channel erosion.

However, the result of this plantation establishment is the enhancement of the water holding capacity of the forest, hence, a positive one. It shall be ensured that the 20 meters on both side of creeks and rivers shall be rehabilitated, maintained, and protected as buffer zones.

With the timber harvesting activities, the use of skidders and logging trucks may cause pollution to rivers and creeks due to siltation. This will result to the decrease in the production of phytoplanktons, zooplanktons and benthos in rivers and creeks.

During road rehabilitation/maintenance, the crossing of heavy equipment and trucks may cause siltation to rivers/creeks. This will also result to the decrease in the production of phytoplanktons, zooplanktons, and benthos in rivers and creeks.

## **1.12. The Air**

### ***1.12.1. Baseline Environmental Conditions***

#### **1.12.1.1. Meteorology/Climatology**

##### **A. Climate**

Based on modified Corona's Climate Classification (1951-2003), the province of Sultan Kudarat falls under Type III and Type IV climate type. Type III is described as "no very pronounced maximum rain period with a dry season lasting only for one to three months" while Type IV is characterized by rainfall which is more or less evenly distributed throughout the year.

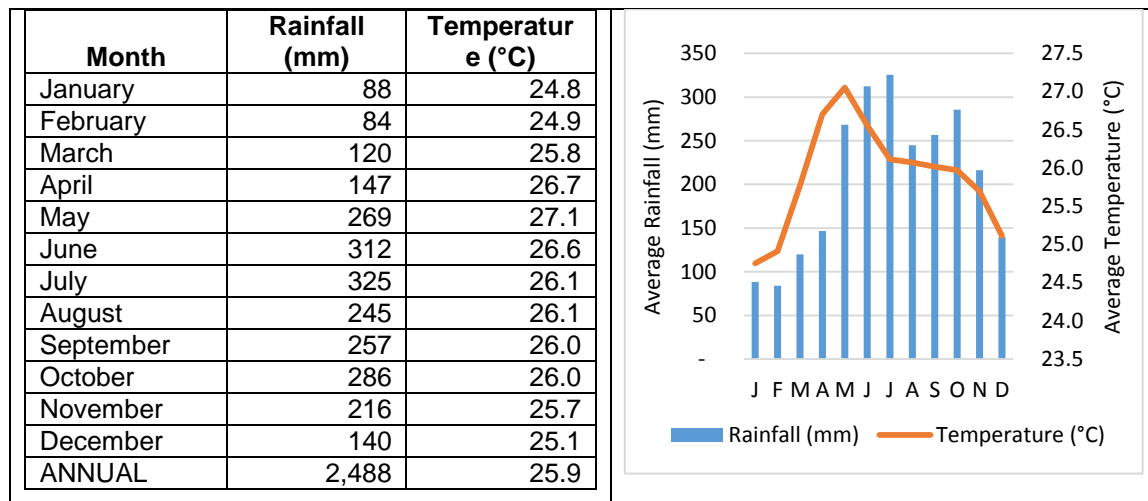
Type III climate is usually experienced by the central part of the province which generally consists of flat terrain (0-3% slope). These areas comprise the municipalities of Lambayong, Tacurong, Pres. Quirino, Lutayan and the low lying areas/plains of Isulan, Bagumbayan, Esperanza and Columbio. These areas usually experience dry season from December to February or March to May. Since this type of climate has a short dry season, it most resembles a Type I climate.

On the other hand, the western part of the province comprising the municipalities of Lebak, Kalamansig, Palimbang, Sen. Ninoy Aquino and the mountainous part of Isulan, Bagumbayan, and Esperanza exhibit a Type IV climate. The same climate pattern is also being experienced by the eastern section of Columbio which is adjacent to the province of Davao del Sur. This type of climate resembles Type II climate characteristics since it has no dry season and the rainfall in these areas is more or less evenly distributed throughout the year.



**B. Rainfall and Temperature**

*Table 1-34. Climatological Normals, Rainfall and Temperature*



Source: Rainfall – PAGASA Cotabato City Weather Station; Temperature – <http://sdwebx.worldbank.org/climateportal/>; MCSI averaging of temperature data 1986-2015

Based on the average of all weather stations in the Philippines, excluding Baguio, the mean annual temperature is 26.6°C. The coolest months fall in January with a mean temperature of 25.5°C while the warmest month occurs in May with a mean temperature of 28.3°C. Latitude is an insignificant factor in the variation of temperature while altitude shows greater contrast in temperature. Thus, the mean annual temperatures of the areas in Sultan Kudarat Province with higher altitudes such as those in the Daguma Mountain Range is expected to be lower than those in the plains and valleys with lower altitudes.

**1.12.1.2. Air Quality (and Noise)**

Ambient air quality in the internal part of the IFMA Area, as observed, is fresh and of good quality and possibly low in terms of total suspended particulates since there are no air polluting activity in the area. However, dust is found to be present in the existing roads.

Noise is also negligible since sounds heard in the area are mostly from existing avifauna. Even with the start of operations, ambient air quality is not expected to change much since burning will be strictly prohibited.

Below are the baseline information conducted by an accredited third party, the Berkman Systems Inc. (BSI) basing two parameters such as Total Suspended Particulates (TSP) and Particulate Matter less than 10 microns (PM10) were being tested and monitored in a two hour duration.

**Total Suspended Particulates**

Sampling of TSP was carried out by using a high-volume sampler. Ambient air was drawn into a covered housing through a collecting medium of a pre-weighed glass microfiber filter paper at a controlled flow rate over the specified sampling period. The filter paper with retained particles was recovered after sampling and desiccated for 24 hours in the

laboratory followed by accurate weighing (gravimetric method) using a calibrated mass balance. The net weight (mass gain) from the initial and final masses of the filter paper corresponds to the total amount of particulates collected. The concentration of TSP in ambient air was determined from the ratio of total mass of particulates collected and the total normal volume of air sampled (total volume of air sampled corrected to normal conditions of 25°C and 760 mm Hg).

#### **Particulate Matter Less than 10 microns**

Sampling of PM<sub>10</sub> was carried out by using a high volume PM<sub>10</sub> sampler. Ambient air was drawn at a controlled flow rate into a specially-shaped cyclone inlet where the larger particulates are inertially separated from PM<sub>10</sub> size range. Each size fraction in the PM<sub>10</sub> size range is then collected on a pre-weighed glass microfiber filter over the specified sampling period. The filter paper with retained particles was recovered after sampling and desiccated for 24 hours in the laboratory followed by accurate weighing using a calibrated mass balance. The net weight (mass gain) from the initial and final masses of the filter paper corresponds to the amount of PM<sub>10</sub> collected. The concentration of PM<sub>10</sub> in ambient air was determined from the ratio of total mass of PM<sub>10</sub> collected and the total normal volume of air sampled.

#### **Sampling Observations**

Meteorological observations such as wind direction and speed were recorded during the duration of the activity in order to correlate the interpretation of the gathered concentrations.

#### **Wind Direction**

Wind Direction is the direction from which the wind originates. It is reported in the cardinal directions. The wind direction in a certain station is determined by observing the motion of the wind from field observation of objects such as trees, grasses, smoke, etc. using a compass as a reference.

#### **Wind Speed**

Wind speeds were recorded during the sampling activity using the Beaufort Wind Scale as a guide. Devised by Britain's Admiral Sir Francis Beaufort, this was one of the first scales used to estimate and report wind speeds via visual observations. *Table 2* details the categorization of the Beaufort wind forces along with the corresponding equivalent speeds, wind descriptions, and land observations.

Table 2. Beaufort Wind Scale

Force	Equivalent Speed (m/s)	Description	Land Observation
BF0	0	Calm	<ul style="list-style-type: none"> <li>• Calm</li> <li>• Smoke rises vertically</li> </ul>
BF1	1	Light Air	<ul style="list-style-type: none"> <li>• Direction of wind shown by smoke drift, but not by wind vanes</li> </ul>
BF2	3	Light Breeze	<ul style="list-style-type: none"> <li>• Wind felt on exposed skin</li> <li>• Leaves rustle</li> <li>• Wind vanes begin to move</li> </ul>
BF3	4.5	Gentle Breeze	<ul style="list-style-type: none"> <li>• Leaves and small twigs constantly moving</li> <li>• Light flags extended</li> </ul>
BF4	7	Moderate Breeze	<ul style="list-style-type: none"> <li>• Dust and loose paper raised</li> <li>• Small branches begin to move</li> </ul>

### Cloud and Rain Description

The systems used to describe sky condition and rain description during the sampling period are outlined in *Tables 3 and 4*, respectively. These terminologies were adopted and used by the Philippine Atmospheric, Geophysical and Astronomical SERVICES Administration (PAGASA).

Table 3 CLOUD DESCRIPTION

Sky Condition	Definition/Description
Clear or Sunny Skies	<ul style="list-style-type: none"> <li>• State of the sky when it is cloudless, totally clear or with few small light clouds visible.</li> <li>• Has a total cloud cover of less than one okta</li> </ul>
Partly Cloudy	<ul style="list-style-type: none"> <li>• State of the sky is within 2-5 oktas total cloud cover or has between 30% to 70% cover of the celestial dome</li> </ul>

Partly Cloudy to at Times Cloudy	<ul style="list-style-type: none"> <li>Mostly partly cloudy but there are times when more than 70% of the celestial dome is covered with clouds.</li> </ul>
Mostly or Mainly Cloudy	<ul style="list-style-type: none"> <li>The sky is mostly covered with clouds but with possible brief periods of sunshine.</li> <li>The total cloud cover is between 6 to 8 oktas.</li> </ul>
Cloudy	<ul style="list-style-type: none"> <li>The sky is covered with clouds between 6 to 8 oktas or has more than 70% cloud cover.</li> <li>Predominantly more clouds than clear sky.</li> <li>For a longer period during the day, the sun is obscured by clouds.</li> </ul>
Overcast	<ul style="list-style-type: none"> <li>The sky is totally or completely covered with thick and opaque clouds, 8 oktas or around 100% cloud cover.</li> </ul>

Source: PAG-ASA

**Table 4. Rain Description**

Rain Description	Definition / Description
Very Light Rains	<ul style="list-style-type: none"> <li>Scattered drops that do not completely wet an exposed surface regardless of duration</li> </ul>
Light Rains	<ul style="list-style-type: none"> <li>The rate of fall is from trace to 2.5 mm per hour.</li> <li>Individual drops easily identified and puddles (small muddy pools) form slowly.</li> <li>Small streams may flow in gutters.</li> </ul>
Moderate Rains	<ul style="list-style-type: none"> <li>The rate of fall is between 2.5 mm to 7.5 mm per hour</li> <li>Puddles rapidly forming and down pipes flowing freely.</li> </ul>
Heavy Rains	<ul style="list-style-type: none"> <li>The rate of fall is greater than 7.5 mm per hour</li> <li>The sky is overcast, there is a continuous precipitation</li> <li>Falls in sheets, misty spray over hard surfaces.</li> <li>May cause roaring noise on roofs.</li> </ul>

Monsoon Rains	<ul style="list-style-type: none"><li>• Heavy and continuous precipitation attributed to either the Southwest or Northeast Monsoon.</li></ul>
Occasional Rains	<ul style="list-style-type: none"><li>• Not frequent but is recurrent precipitation.</li></ul>
Widespread Rains	<ul style="list-style-type: none"><li>• Precipitation occurring extensively throughout the area</li></ul>
Frequent Rains	<ul style="list-style-type: none"><li>• Precipitation occurring regularly and often throughout the time duration.</li></ul>
Intermittent Rains	<ul style="list-style-type: none"><li>• Precipitation which ceases at times and re-occur again</li></ul>

*Source: PAG-ASA*

### **Ambient Noise Level Monitoring**

A direct-reading sound level meter (in A-weighting mode) was used to collect noise level data at each sampling station. A weighted (Dba) Scale was selected as required by the 1978 NPCC and the 1980 NPCC standards were also based on the same weighting network. A-weighting network most closely approximates the response of human ear to various sound frequencies.

The procedure used followed that of Wilson (1989), in which at least a total of fifty (50) readings were recorded in order to increase the confidence limits of the data. Procedures outlined by Wilson (1989) were adopted in the monitoring as the time interval, duration of sampling. Size of data needed, and methods of noise level analysis were not specified in the 1978 NPCC.

For daytime ambient monitoring, data were collected between 0900H-1800H and 1800H-2200H for evening ambient monitoring. According to the provision provided in the NPCC Memorandum Circular 002 (1980), the arithmetic median of seven (7) maximum-recorded noise levels is regarded as the noise-level comparable to the standard. Field observations during the monitoring were also noted so as to identify the primary sources of noise in each area.

### **Ambient Air Quality Monitoring**

Two (2) designated sampling stations were assessed with TSP and PM<sub>10</sub>. The pollutant concentrations, as presented in *Table 5*, have complied with the DENR National Ambient Air Quality Standards (NAAQS) for Source Specific Air Pollutants of 300 µ/Ncm for TSP and 200 µg/Ncm for PM<sub>10</sub>—all were based on 60 minutes averaging time.



Station	Location	Time of Sampling	TSP	PM <sub>10</sub>
A1	Alpha I, Proposed Plant Site	1535H-1635H	29.7	1.9
A2	Near Gate Bravo, Brgy. Salumping	1655H-1755H	120.1	25.9
<b>DENR National Ambient Air Quality Standards for Source Specific Air Pollutants based on 60 minutes averaging time</b>			<b>300</b>	<b>200</b>

Sampling observations and photo documentations are summarized in Table 6. Also, location map of the sampling stations is shown in *Figure 1* in the succeeding page.

Moreover, the summary of results including the gathered meteorological data, laboratory certificate of analyses and calibration records of the equipment used were attached in *Annexes \_\_, \_\_ and \_\_*, respectively.

### **1.12.2. Impact Assessment**

#### **1.12.2.1. Pre-Operations Phase**

The impacts for pre-operations activity (stand inventory, research, planning) are nil.

#### **1.12.2.2. Operations Phase**

During operations phase, the forest plantation establishment and harvesting activities will entail the use of trucks and heavy equipment. This will increase the ambient noise level and the total suspended particulates (TSP) in the area.

In forest harvesting, the removal of photosynthesizing plants will affect CO<sub>2</sub> sequestration causing some degree of effect on the microclimate. Planting and reforestation, however, will generate biomass which will help in carbon sequestration.

## **1.13. The People**

### **1.13.1. Baseline Environmental Conditions**

This section presents the socio-economic profile of the Municipalities of Esperanza, Lebak, Kalamansig, Senator Ninoy Aquino, and Bagumbayan, Province of Sultan Kudarat. These are the municipalities where the consolidated IFMA is located. It also discusses the results of the socio-economic profiling conducted by Mallonga Consulting Services, Inc. covering the direct impact area of Barangay Pamantingan and the indirect impact areas of Barangays Salumping, Legodon and Margues.

Legodon was formerly a sitio of Barangay Salumping. On February 26, 2009, the Sangguniang Panlalawigan of Sultan Kudarat enacted Provincial Ordinance No. 01-01, creating Sitio Legodon into a regular Barangay. However, this change is not reflected yet in the the Philippine Statistics Authority data. Thus, in the interest of simplification and consistency, data for Legodon is included in Barangay Salumping in this study.

The profiles include data from the Philippine Statistics Authority (PSA), the provincial, municipal and barangay local government units, and the socio-economic survey conducted on August 26 – 31, 2018 by the Mallonga Consulting Services, Inc.

#### 1.13.1.1. Population and demography

##### A. Population and average annual growth rate

Altogether, the total population of 317,965 of the 5 municipalities in 2015 represent about 39.2% of the province of Sultan Kudarat. The average annual growth rates (AAGR) in these municipalities from 1990 to 2015 shows fluctuations but is generally declining. The highest AAGRs occurred from 1990 to 1995 with the province experiencing a 3.7% increase during this period. Among the 5 municipalities, the municipality of Senator Ninoy Aquino had the highest AAGR at 6.4%. Between 2010 to 2015, however, all municipalities (except Kalamansig) experienced relatively low growth rates. (**Table 2-28**).

*Table 1-35. Population and Average Annual Growth Rates, Selected Municipalities, 1990-2015:*

Province/ Municipality	Population					Average Annual Growth Rate			
	1990	1995	2000	2010	2015	1990 - 1995	1995 - 2000	2000 - 2010	2010 - 2015
SULTAN KUDARAT	435,905	522,187	585,457	747,087	812,095	3.7	2.3	2.5	1.7
Bagumbayan	36,524	45,584	53,444	63,700	67,061	4.5	3.2	1.8	1.0
Esperanza	35,585	43,374	47,578	63,207	66,095	4.0	1.9	2.9	0.9
Kalamansig	30,779	35,900	44,645	46,408	49,059	3.1	4.5	0.4	1.1
Lebak	52,428	61,884	70,899	83,280	88,868	3.3	2.8	1.6	1.3
Sen. Ninoy Aquino	20,879	28,768	30,222	43,508	46,882	6.4	1.0	3.7	1.5

Source: PSA; AAGR Calculations - MCSI

The decline in population is further magnified in the Municipality of Esperanza where both Barangays Pamantingan and Margues experienced negative growth rates from 2010 to 2015 whereas 2000-2010 was a period of high population growth for all three barangays. The population growth rate in 2010-2015 was also slow for Barangay Salumping. (**Table 2-29**). These trends coincide with periods of high activity in these areas from 2000 to 2010 for M&S Company and its sister company, Silvicultural Industries Inc. (SII) and slow downs and stoppages in operations between 2010 - 2015.

*Table 1-36. Population and Average Annual Growth Rates, Project Impact Areas, 1990-2015*

Municipality/ Barangay	Population					Average Annual Growth Rate			
	1990	1995	2000	2010	2015	1990 - 1995	1995 - 2000	2000 - 2010	2010 - 2015
ESPERANZA	35,585	43,374	47,578	63,207	66,095	4.0	1.9	2.9	0.9
Pamantingan	2,297	2,530	2,536	4,164	3,901	2.0	0.0	5.1	(1.3)
Salumping	n.d.	2,645	4,008	6,274	7,577		8.7	4.6	3.8
Margues	1,043	1,884	2,374	3,078	2,671	12.6	4.7	2.6	(2.8)

Source: PSA; AAGR Calculations – MCSI

### *B. Number of Households and Average Family Size*

In 2015, the number of households in the five municipalities was recorded at 74,396, higher by 6,394 households compared with the 67,982 households posted in 2010. Average household size in each municipality has been declining since 2000. (**Table 2-30**).

*Table 1-37. Number of Households and Household Size, Selected Municipalities, 1990-2015*

Province/ Municipality	Number of Households					Household Size		
	1990	1995	2000	2010	2015	2000	2010	2015
SULTAN KUDARAT	261,700	308,672	340,669	168,909	184,650	5.1	4.4	4.4
Bagumbayan	6,642	9,624	10,368	14,243	15,440	5.2	4.5	4.3
Esperanza	6,659	8,810	9,598	14,376	15,868	5.0	4.4	4.2
Kalamansig	5,437	7,946	8,640	10,397	10,957	5.2	4.5	4.5
Lebak	9,452	12,760	13,856	18,657	20,388	5.1	4.5	4.3
Sen. Ninoy Aquino	3,892	6,014	6,172	10,309	11,723	4.9	4.2	4.0

Source: PSA

All IFMA project impact areas show an increase in the number of households in line with the population increase. Available data indicate that household size is also declining in these communities. (**Table 2-31**).

*Table 1-38. Number of Households and Household Size, Project Impact Areas, 1990-2010*

Municipality/ Barangay	Number of Households				Household Size	
	1990	1995	2000	2010	2000	2010
ESPERANZA	6,659	8,810	9,598	14,376	5.0	4.4
Pamantingan	595	510	542	913	4.7	4.6
Salumping		582	890	1495	4.5	4.2
Marquez	215	483	534	720	4.5	4.3

Source: PSA

### *C. Land Area and Population Density*

As of 2015, Esperanza was the most densely populated at 186 persons per square kilometer followed by Lebak at 158 persons per square kilometer; and Senator Ninoy Aquino at 123 persons per square kilometer. The municipality of Kalamansig was the least densely populated at 98 persons per square kilometer. (**Table 2-32**).

*Table 1-39. Land Area and Population Density by Censal Year, Selected Municipalities, 1990-2015*

Province/ Municipality	Land Area (sq.km.)	% Share in Land Area	Density (Persons/sq.km.)				
			1990	1995	2000	2010	2015
SULTAN KUDARAT	5,135.30	100.0	85	102	114	145	158
Bagumbayan	593.00	11.5	62	77	90	107	113
Esperanza	356.00	6.9	100	122	134	178	186
Kalamansig	501.70	9.8	61	72	89	93	98
Lebak	562.70	11.0	93	110	126	148	158
Sen. Ninoy Aquino	382.50	7.4	55	75	79	114	123

Sources: PSA; 2010 Socio-Economic Profile ;Sultan Kudarat Province, [www.sultankudaratprovince.gov.ph](http://www.sultankudaratprovince.gov.ph) Retrieved 8/26/18; MCSI calculations

Pamantingan which has the smallest land area out of all the project impact areas is most densely populated at 89 persons per square kilometer while Margues is the least densely populated at 32 persons per square kilometer. (**Table 2-33**).

*.Table 1-40. Land Area and Population Density, Project Impact Areas, 1990-2015*

Municipality/ Barangay	Land Area (sq.km.)	% Share in Land Area	Density (Persons/sq.km.)				
			1990	1995	2000	2010	2015
ESPERANZA	356.00	6.9	100	122	134	178	186
Pamantingan	43.89	12.3	52	58	58	95	89
Salumping	157.31	44.2		17	25	40	48
Margues	83.83	23.5	12	22	28	37	32

Sources: PSA; 2010 Socio-Economic Profile; Sultan Kudarat Province, [www.sultankudaratprovince.gov.ph](http://www.sultankudaratprovince.gov.ph) Retrieved 8/26/18; 2017 Socio-Economic Profile, Municipality of Esperanza, MPDO Staff; MCSI calculations

It should be noted that the settlement pattern in these impact barangays show a large number of the population clustered around or near the barangay hall, with the second largest sitio situated far from the barangay and smaller settlements scattered around the barangay either in clusters or in isolation as shown in the Settlements Map overleaf. (**Map 2-18**).

#### *D. Age-Sex Structure*

In the Province of Sultan Kudarat, children 5 to 9 years comprised the largest age group making up 11.8% of the household population followed by those in the age groups 0 to 4 years (11.3%), 10 to 14 years (11.2%) and 15 to 19 years (10.8%).

Males (51.7%) outnumbered females in the age groups 0 to 54 years while females outnumbered their male counterparts in the older age groups. (**Figure 2-4**).

Map 1-23. Settlements Map covering Project Impact Areas

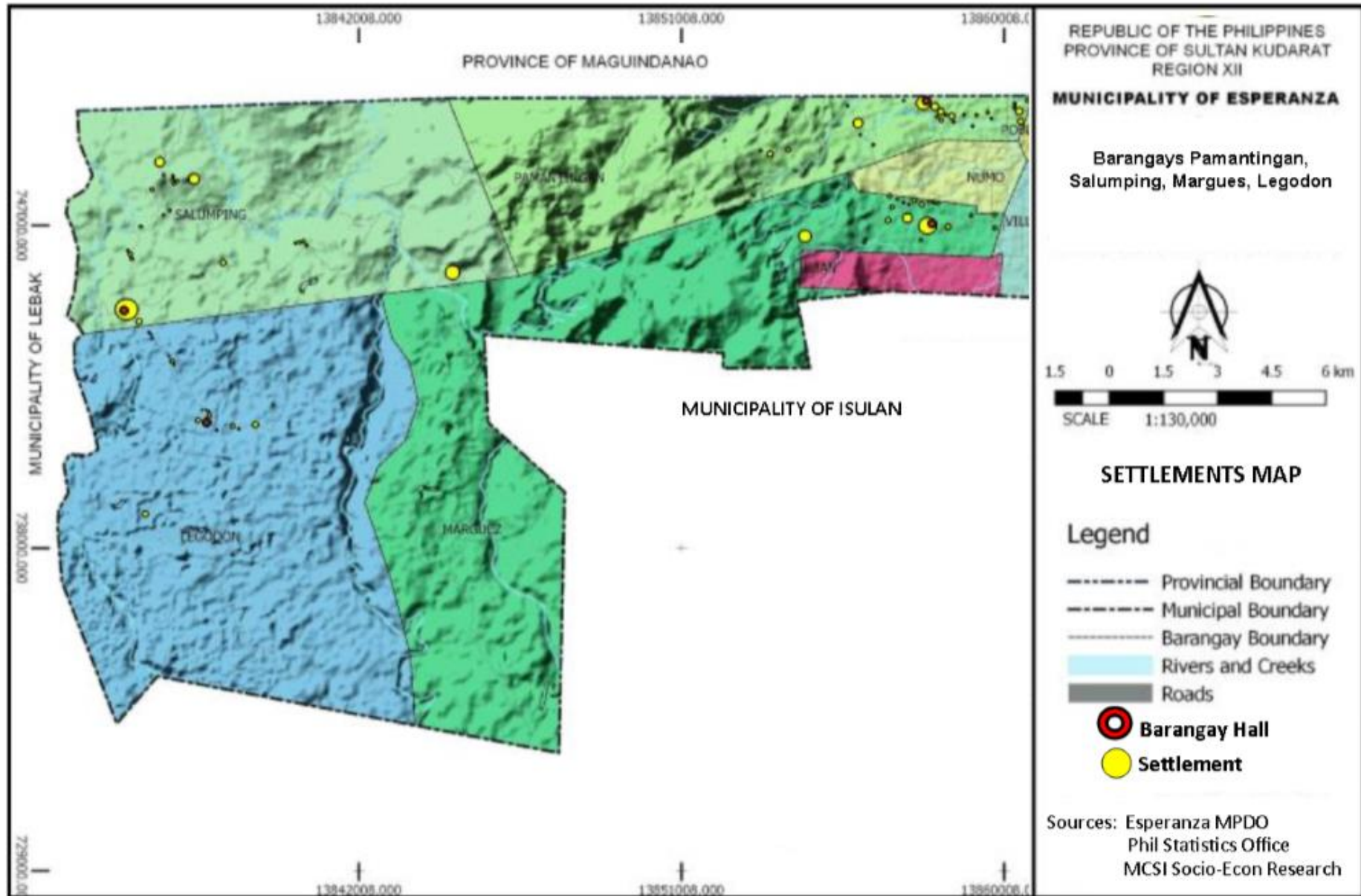
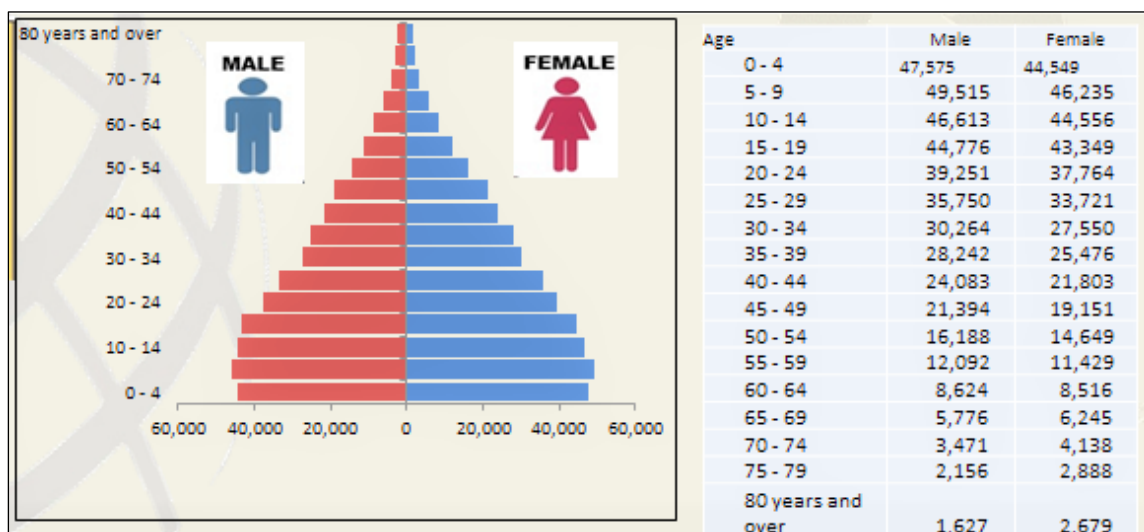


Figure 1-4. Age-Sex Pyramid, Sultan Kudarat, 2015



Source: *Demographic and Socio-Economic Characteristics of the Population of Sultan Kudarat Province (Based on the Results of POPCEN 2015 Highlights)*, [www.rssso12.psa.gov.ph](http://www.rssso12.psa.gov.ph)

#### 1.13.1.2. Household Profile based on the Results of the Socio-Economic Survey

The team interviewed 269 sample households in the area: Pamantingan – 249 households, Salumping – 12 households, and Margues – 8 households. Only sitios covered by proposed IFMA project were included in the survey.

Target respondents were, in order of priority, (1) heads of households, (2) spouses of heads of households, and (3) adult member of household. Spouses and other adult members of the household 15 years and over were included as target representatives because of the unpredictable availability of the household heads during the study period.

Total number of household members in the household survey were as follows: Pamantingan – 790, Salumping – 47, and Margues – 38.

#### A. Barangay Pamantingan

##### A.1. Socio-Economic Profile

##### A.1.a.i. Population

As of 2015, the population of Pamantingan was 3,901, a decrease of 1.3% from the 2010 population of 4,164. (**Table 2-34** and **Figure 2-5**).

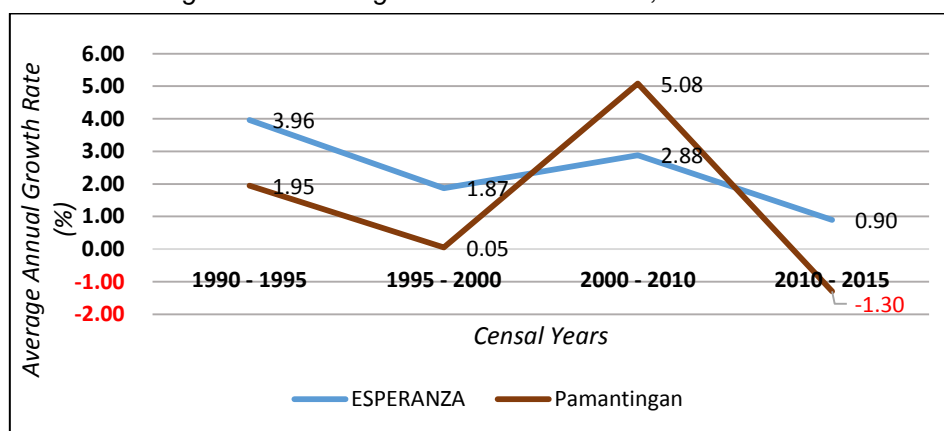


*Table 1-41. Population and Average Annual Growth Rate, 1990 - 2015*

	Population				
	1990	1995	2000	2010	2015
ESPERANZA	35,585	43,374	47,578	63,207	66,095
Pamantingan	2,297	2,530	2,536	4,164	3,901
% Share	6.5	5.8	5.3	6.6	5.9
	Average Annual Growth Rate (AAGR)				
	1990 - 1995	1995 - 2000	2000 - 2010	2010 - 2015	2000 - 2015
ESPERANZA	3.96	1.87	2.88	0.90	2.22
Pamantingan	1.95	0.05	5.08	(1.30)	2.91

Source: Philippine Statistics Authority; AAGR – MCSI calculations (geometric method)

*Figure 1-5. Average Annual Growth Rate, 1990 - 2015*



Source: MCSI calculations from PSA data

Pamantingan mirrors the growth rate of Esperanza, albeit more intensely. Between 1990 and 1995, Pamantingan's population was growing at an AAGR of 1.95 but declined with an AAGR of 0.05% between 1995 to 2000. The population growth rate spiked to an unprecedented 5.08% during the period 2000 to 2010, most probably due to the availability of jobs in the area as a result of M&S Company operations. However, the population growth had a sharp decline to negative 1.30% from 2010 to 2015, most probably due to slow downs and stoppages of M&S Company operations due to armed threats from the Proposed People's Army.

#### A.1.a.ii. Projected Population

Based on the 2015 population and AAGR between 2000 to 2015 of 2.91%, the projected population for Pamantingan is 4,250. (**Table 2-35**).

*Table 1-42. Projected Population, 2016 - 2018*

	2015 Population (PSA Census)	Projected Population		
		2016	2017	2018
ESPERANZA	66,095	68,012	69,984	72,014
Pamantingan	3,901	4,014	4,131	4,250

Source: MCSI projections from PSA data

#### A.1.a.iii. Average household size

Municipal-wide, average household size in 2015 was 4.2 compared to 4.5 in 2010. (Philippine Statistics Authority). At an average household size of 4.2, the number of households in 2018 is estimated at 1,012 households.

Total number of household in this 2018 LSEP survey is 249 with 790 household members.

The household composition ranged from one to ten persons. One-person households made up 23.3% of all households followed by four-person households (19.7%) and households of two persons and three persons, each at 18.1% of total number of households. (**Table 2-36**). Average household size is 3.2, lower than the municipal-wide 4.2 figure.

*Table 1-43. Distribution of Households by Household Size, Pamantingan, 2018*

Household Size	No.	%
One person	58	23.3
Two persons	45	18.1
Three persons	45	18.1
Four persons	49	19.7
Five persons	26	10.4
Six persons	12	4.8
Seven persons	8	3.2
Eight persons	2	0.8
Nine persons	3	1.2
Ten persons	1	0.4
<b>TOTAL</b>	<b>249</b>	<b>100.0</b>

Source: MSCI LSEP, 2018

### **1.13.2. Age-sex structure**

In 2018, persons in Pamantingan aged 10 to 14 years (12.9%) comprised the largest age group, followed by those in the age groups 5 to 9 years (10.5%) and 5 to 9 years (10.3%). (**Table 2-37**).

*Table 1-44. Distribution of Household Population by Age Group and Sex, and Sex Ratio by Age Group, Pamantingan, 2018*

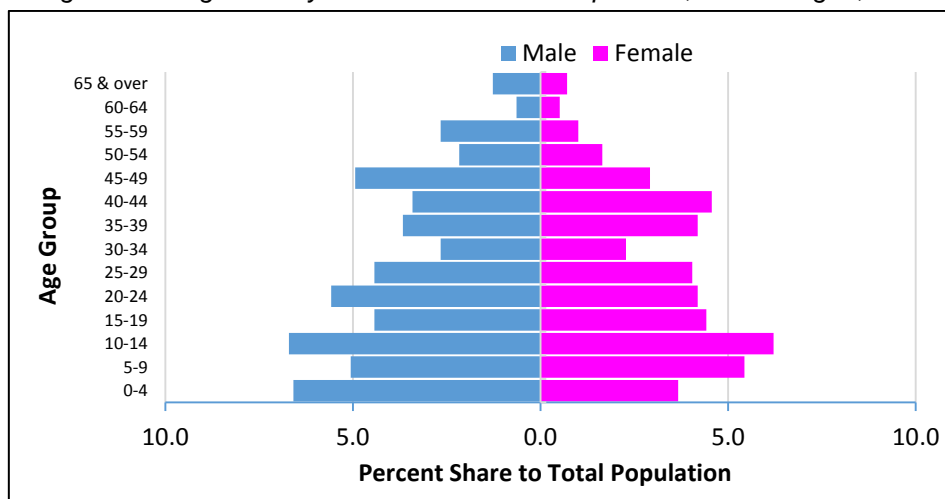
Age Group	Male		Female		Both Sexes		Sex Ratio
	No.	%	No.	%	No.	%	
0-4	52	12.1	29	8.0	81	10.3	179
5-9	40	9.3	43	11.9	83	10.5	93
10-14	53	12.4	49	13.5	102	12.9	108
15-19	35	8.2	35	9.7	70	8.9	100
20-24	44	10.3	33	9.1	77	9.7	133
25-29	35	8.2	32	8.8	67	8.5	109
30-34	21	4.9	18	5.0	39	4.9	117
35-39	29	6.8	33	9.1	62	7.8	88
40-44	27	6.3	36	9.9	63	8.0	75
45-49	39	9.1	23	6.4	62	7.8	170
50-54	17	4.0	13	3.6	30	3.8	131
55-59	21	4.9	8	2.2	29	3.7	263
60-64	5	1.2	4	1.1	9	1.1	125
65 and over	10	2.4	6	1.8	16	2.0	300
<b>Total</b>	<b>428</b>	<b>100.0</b>	<b>362</b>	<b>100.0</b>	<b>790</b>	<b>100.0</b>	<b>118</b>

Source: MSCI LSEP, 2018

Males accounted for 54.2% while females comprised 45.8%. These figures resulted in a sex ratio of 118 males for every 100 females.

The age-sex structure in Pamantingan generally follows the Philippine trend where the youngest age groups have the biggest population and the oldest the smallest population with male and female share of the population only slightly different. **(Figure 2-6).**

*Figure 1-6. Age Sex Pyramid of Household Population, Pamantingan, 2018*



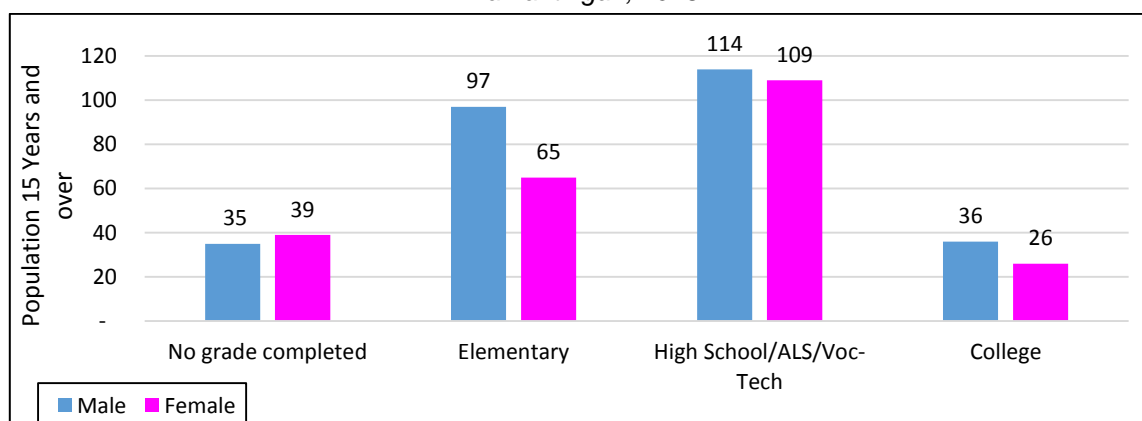
Source: MSCI LSEP, 2018

### **1.13.3. Highest grade completed**

Of the household population aged five years and over, 278 or 39.2% had attended or completed elementary education, 243 (34.3 %) had reached or finished high school or its equivalent in Alternative Learning System (ALS), 3.1 % were college undergraduates, and 5.6 % were college graduates. **(Figure 2-7).**

Of the household population 15 years and over, more males had attained higher education than females. Among those with an academic degree, the males (52.5.0 %) outnumbered the females (47.5 %). There were also more males (68.2%) who were college undergraduates. **(Figure 2-7).**

*Figure 1-7. Distribution of Population 15 Years and Over by Educational Attainment, Pamantingan, 2018*



Source: MSCI LSEP 2018

Pamantingan has medium high functional literacy rate with 86.6% of the population able to read (**Table 2-38**) and 93.3% able to count. (**Table 2-39**). Males outnumbered females in both abilities to read and to count.

*Table 1-45. Distribution of Household Population 10 Years and Over by Sex, Age Group, and Ability to Read, Pamantingan, 2018*

Age Group	Household Population 10 Years and Over	Number and Proportion of Population with Ability to Read					
		Total		Male		Female	
		No.	%	No.	%	No.	%
10-14	102	96	94.1	48	50.0	48	50.0
15-19	70	66	94.3	33	50.0	33	50.0
20-24	77	63	81.8	36	57.1	27	42.9
25-29	67	60	89.6	33	55.0	27	45.0
30-34	39	32	82.1	17	53.1	15	46.9
35-39	62	53	85.5	23	43.4	30	56.6
40-44	63	53	84.1	24	45.3	29	54.7
45-49	62	53	85.5	33	62.3	20	37.7
50-54	30	21	70.0	12	57.1	9	42.9
55-59	29	28	96.6	21	75.0	7	25.0
60-64	9	8	88.9	5	62.5	3	37.5
65 & over	16	9	56.3	7	77.8	2	22.2
<b>Total</b>	<b>626</b>	<b>542</b>	<b>86.6</b>	<b>292</b>	<b>53.9</b>	<b>250</b>	<b>46.1</b>

Source: MSCI LSEP, 2018

*Table 1-46. Distribution of Household Population 10 Years and Over by Sex, Age Group, and Ability to Count, Pamantingan, 2018*

Age Group	Household Population 10 Years and Over	Number and Proportion of Population with Ability to Count					
		Total		Male		Female	
		No.	%	No.	%	No.	%
10-14	102	99	97.1	51	51.5	48	48.5
15-19	70	63	90.0	32	50.8	31	49.2
20-24	77	69	89.6	38	55.1	31	44.9
25-29	67	64	95.5	35	54.7	29	45.3
30-34	39	35	89.7	19	54.3	16	45.7
35-39	62	58	93.5	27	46.6	31	53.4
40-44	63	60	95.2	27	45.0	33	55.0
45-49	62	60	96.8	39	65.0	21	35.0
50-54	30	26	86.7	15	57.7	11	42.3
55-59	29	29	100.0	21	72.4	8	27.6
60-64	9	9	100.0	5	55.6	4	44.4
65 & over	16	12	75.0	8	66.7	4	33.3
<b>Total</b>	<b>626</b>	<b>584</b>	<b>93.3</b>	<b>317</b>	<b>54.3</b>	<b>267</b>	<b>45.7</b>

Source: MSCI LSEP, 2018

#### 1.13.3.1. Labor force participation and employment rate

The population 15 years old and over of Pamantingan households was 524 wherein only 385 persons were in the labor force, either employed or unemployed. These figures placed the labor force participation rate (LFPR) at 73.5%. (**Table 2-40**).

*Table 1-47. Labor Force Participation and Employment Rate, Pamantingan, 2018*

Indicator	Both Sexes	Male	Female
-----------	------------	------	--------

Population 15 years & over	524	283	241
Labor Force	385	249	136
Labor Force Participation Rate (%)	73.5	88.0	56.4
Employed Persons	354	241	113
Employment Rate (%)	91.9	96.8	83.1
Unemployed Persons	31	8	23
Unemployment Rate (%)	8.1	3.2	16.9

Source: MSCI LSEP, 2018

About 26.5% of the population 15 years old and over were not in the labor force, i.e. housewives, students, persons with disability, and retirees, etc. Around 75.4% of those not in the labor force were women, most of whom are housewives or students.

### 1.13.3.2. Total monthly income and source

The total monthly household income of all respondent-households was Php 3.01 million. (Table 2-41). The household income came from earned income and other sources.

Table 1-48. Total Monthly Household Income by Source, Pamantingan, 2018

Source of Income	Income		Households	
	Value (Php)	%	Number	%
<b>Total</b>	<b>3,013,356</b>	<b>100.0</b>	<b>245</b>	<b>100.0</b>
Wages/Salaries	1,772,523	58.8	175	71.4
Farming	890,583	29.6	119	48.6
Fishing	2,500	0.1	2	0.8
Self-Employment (Trade & Craft)	110,200	3.7	26	10.6
Entrepreneurial Activities	60,600	2.0	16	6.5
Contributions from Family Members	39,700	1.3	8	3.3
Pension	31,200	1.0	9	3.7
Government assistance	106,050	3.5	50	20.4

Source: MSCI LSEP, 2018

The main source of income was wages/salaries, contributing Php 1.77 million or 58.8% of total household income. The other major source of earned income was farming (29.6%). Fishing, self-employment (craft and trade), and entrepreneurial activities contributed a total of 5.8%. Contributions from family members (local and OFW) totaled 1.3% while pensions for senior citizens comprised 1.0% and government assistance comprised 3.5%.

### 1.13.3.3. Number of sources of earned income of households

About two-thirds (64.1%) of the households in Pamantingan rely on a single source of income, 2.0% have no earned income source, while the rest depend on two to three sources. The average monthly earned income from three sources across all income classes is Php 26,052, about 2.9 times the average monthly earned income from a single source. (Table 2-42).

Table 1-49. Distribution of Households by Average Monthly Income, Income Class, and Number of Sources of Income, Pamantingan, 2018

Household Characteristic	ALL INCOME CLASSES	Income Class (Php)					
		Under 3,000	3,000-4,999	5,000-7,999	8,000-13,999	14,000-19,999	20,000 & over
<b>Total Households</b>	<b>245</b>	<b>14</b>	<b>16</b>	<b>73</b>	<b>73</b>	<b>38</b>	<b>31</b>
<b>Number of Households by Number of Earned Income Sources</b>							
No earned source	5						
Single Source	157	9	14	64	48	13	9

Two Sources	68	2		9	23	19	15
Three Sources	15				2	6	7
<b>Average Monthly Earned Income by Number of Sources (Php)</b>							
Single Source	9,032	2,296	3,492	6,404	10,050	15,916	27,690
Two Sources	17,526	2,350		7,117	10,175	16,256	38,675
Three Sources	26,052				12,100	17,217	37,611

Source: MSCI LSEP, 2018

#### 1.13.3.4. Average monthly income from all sources

A large proportion (71.5%) of households source their income from wages and salaries while 48.6% earn income from farming. Relatively few households obtain their income from fishing, self-employment, entrepreneurship, and assistance from government and family members. Among all income sources, wages and salaries contribute the highest average monthly income at Php 10,129 followed by farming at Php 7,484 and contributions from family members at Php 4,963. (**Table 2-43**).

*Table 1-50. Distribution of Households by Average Monthly Income, Income Class, and Type of Income Source, Pamantingan, 2018*

Household Characteristic	ALL INCOME CLASSES	Income Class (Php)					
		Under 3,000	3,000- 4,999	5,000- 7,999	8,000- 13,999	14,000- 19,999	20,000 & over
Number of Households by Income Source							
All Sources	405	18	16	92	119	85	75
Wages/salaries	175	3	3	48	59	33	29
Farming	119	10	10	29	29	21	20
Fishing	2	0	0	0	0	1	1
Self-Employment	26	0	0	4	12	5	5
Entrepreneurial Activities	16	0	1	1	0	9	5
Contributions from Family	8	1	0	0	0	3	4
Pension	9	0	0	1	2	3	3
Government assistance	50	4	2	9	17	10	8
Average Monthly Income by Income Source (Php)							
All Sources	12,299	2,190	3,530	6,492	10,146	16,291	35,245
Wages/salaries	10,129	1,720	3,512	6,449	8,363	11,319	20,011
Farming	7,484	1,820	3,535	4,195	5,853	7,402	19,509
Fishing	1,250	.	.	.	.	1,500	1,000
Self-Employment	4,238	.	.	5,250	2,983	3,780	6,900
Entrepreneurial Activities	3,788	.	3,000	1,000	.	3,178	5,600
Contributions from Family	4,963	2,000	.	.	.	2,233	7,750
Pension	3,467	.	.	5,200	4,000	3,267	2,733
Government assistance	2,121	1,325	3,800	1,722	1,979	2,460	2,425

Source: MSCI LSEP, 2018

#### A.1. Availability of public services

##### A.1.a. Schools

There are 7 pre-schools, 4 primary schools, 3 elementary schools, and one secondary school in Pamantingan. (**Table 2-44**). These are all public schools. There are no tertiary education facilities, public or private, in Pamantingan.

*Table 1-51. Existing Public Schools in Barangay Pamantingan*

SCHOOL LEVEL	NAME OF SCHOOL	LOCATION
Secondary	1. Plamango Integrated School	Plamango, Pamantingan
Elementary	2. Manirub Elem. School	Manirub, Pamantingan



Primary	3. Pamantingan Elem. School	Barangay Pamantingan
	4. Sultan Sinanggayen Elem. School	Barangay Ilian
	5. Plamango Elem. School	Plamango, Pamantingan
	1. Lifi-Lifian Primary School	Lifi-Lifian, Pamantingan
	2. Bongo-Bongo Primary School	Bongo-Bongo, Pamantingan
Pre-School	3. Abang Primary School	Abang, Pamantingan
	4. Tiger Primary School	Tiger, Pamantingan
	1. Manirub Pre-School	Manirub, Pamantingan
	2. Pamantingan Pre-School	Barangay Pamantingan
	3. Plamango Pre-School	Plamango, Pamantingan
	4. Lifi-Lifian Pre-School	Lifi-Lifian, Pamantingan

Table 2-44, end

SCHOOL LEVEL	NAME OF SCHOOL	LOCATION
Pre-School	5. Abang Pre-School	Abang, Pamantingan
	6. Bongo-Bongo Pre-School	Bongo-Bong, Pamantingan
	7. Tiger Pre-School	Tiger, Pamantingan

Source: *Esperanza Socio-Economic Profile, 2017*

Private schools offering elementary and secondary-level education are mostly located in barangays in the eastern part of Esperanza along with private institutions offering tertiary education. (Table 3). There are no private schools in Pamantingan.

Table 1-52. Existing Private Schools in the Municipality of Esperanza

SCHOOL LEVEL	NAME OF SCHOOL	LOCATION
Elementary	Esperanza District Adventist Academy, Inc.	Barangay Sagasa
Elementary/ Secondary	Notre Dame of Esperanza, Inc.	Barangay Saliao
Secondary	Notre Dame of Dukay	Barangay Dukay
Secondary/ Tertiary	Tamondong Memorial School	Barangay Ala
	4-A School of Excellence	Barangay Saliao

Source: *Esperanza Socio-Economic Profile, 2017*

#### A.1.b. Health institutions

Barangay Pamantingan has a Barangay Health Station (BHS) manned by midwives and Barangay Health Workers. Basic health services such as immunization, blood pressure test, pre and post-natal check-up, wound dressing, supplemental feeding and child delivery (2<sup>nd</sup> to 5<sup>th</sup> delivery) are available in the BHS.

#### A.1.c. Housing

Most houses in Pamantingan are constructed through self-finance. M&S Company also provides housing to employees. There are no subdivision projects in the area.

#### A.1.d. Light and water services

All light and power services in the municipality of Esperanza are provided by the Sultan Kudarat Electric Cooperative, Inc. (SUKELCO). As of 2016, 249 households or 22.17% of the total 1,123 households in Pamantingan were served by SUKELCO.

Pamantingan sources its Level II water supply system from a spring. As of 2014, 913 households were served by 73 communal faucets.

*A.1.e. Protective services*

The Philippine National Police consisting of 56 Police Officers and 4 Non-Uniformed Personnel maintains the peace and order in the municipality. They are stationed at Poblacion Esperanza.

Protective services in Pamantingan are mostly provided by the members of the Civilian Volunteers Organization (CVO), Citizen Organized on Protection (COOP), and Barangay Tanod. A municipal-wide group of Watchmen and Barangay Peacekeeping Action Team (BFAT) also provide protective services.

*A.1.f. Communication services*

There are no communication facilities located within Pamantingan. Postal services, internet providers, telephone service providers, cellular site networks, and public calling stations are all located in Poblacion Esperanza and its neighboring barangays in the east.

*A.1.g. Other barangay facilities and services*

Pamantingan has 6 public Day Care Centers housed in structures made of predominantly light materials. Located in different sitios, the centers are:

1. Manirub Day Care Center
2. Pamantingan Day Care Center
3. Ku-ed Day Care Center
4. Plamango Day Care Center
5. Kuhanen Day Care Center
6. Lifi-lifian Day Care Center

Aside from day care centers, there is also a Senior Citizens Center, a mini-gymnasium, and a multi-purpose building, all located near the Barangay Hall.

*A.1.h. Civil society organizations*

Accredited civil society organizations in Pamantingan include the Rural Improvement Club of Purok Dhalia, Pamantingan Sustainable Livelihood Association and the Pamantingan Water Works Association.

**1.13.4. Impact Assessment**

The project's presence in the area will bring about the following benefits to the community from:

1. Employment of impact area residents 18 years old and above especially Indigenous Peoples;
2. Increase in household income due to employment of family members in the project or engaging in business (vending or sari-sari store);
3. Enhancement of technical skills of workers as a consequence of training and experience in the project; and
4. Increase in barangay revenues from barangay clearances, service fees or charges, toll fees or charges, and share in the internal revenue allotment (IRA).

The most significant impacts of the project are its positive impacts on the people in terms of labor and employment, business and income opportunities. These impacts will be experienced during the construction and operational phases.

#### **1.13.4.1. Employment Opportunities**

IFMA operations will provide additional employment opportunities for the people of Esperanza and the immediate surrounding communities. The employment opportunities have significant economic implications in the short term as the absolute increases in wage earners in the locality create additional demand for goods and services.

Workers for the IFMA project will be sourced from within the impact and nearby barangays. Workers' salaries enable households to cover essential services foremost of which are daily food requirements and schooling.

#### **1.13.4.2. Business/Income Opportunities**

Business activities are also expected to increase with the influx of workers possibly from the far reaches of the barangay which translates to an increase in demand for goods, services, and possibly including housing. Residents in the area who operate sari-sari stores could benefit by selling their wares on site. This could also encourage residents to put up carinderias or eateries or additional sari-sari stores near the site. The need for transportation will also help increase the source of income for motorcycles or trisikad drivers.

#### **1.13.4.3. Traffic**

With the influx of workers and the use of heavy equipment including dumptrucks for hauling personnel, equipment and logs, increase in traffic is expected to occur.

### 3. ENVIRONMENTAL MANAGEMENT PLAN

*Table 0-1. Impacts Management Plan*

Project Phase / Environmental Aspect / Project Activities	Environmental Component likely to be affected	Potential and Predicted Impacts	Options for Prevention or Mitigation and Enhancement Measures	Responsible Entity	Indicative Cost	Guarantee / Financial Arrange-- ments
<b>Pre-Operations Phase</b>						
<ul style="list-style-type: none"> <li>Survey &amp; mapping</li> <li>Road rehab &amp; Maintenance</li> <li>Repair and maintenance of existing support facilities</li> </ul>	Land	<p><i>*Erosion</i></p> <p><i>*Delapidation of Roads</i></p>	<p><i>*No logging operations allowed on highly eroded areas</i></p> <p><i>*Highly eroded areas and boundary should be properly marked in the map</i></p> <p><i>*frequent road rehab and maintenance</i></p> <p><i>*Avoid passing through the road during heavy rainfall</i></p>	MSCI, EMB,LGU	150,000.00	EMP/EMF
	Air & noise quality	<i>*Dust Generation</i>	<p><i>*Cover backload of hauler trucks with canvass</i></p> <p><i>*Regular sprinkling of water of unpaved roads or exposed soils /grounds</i></p> <p><i>*Removed muds and dirt on trucks wheel.</i></p> <p><i>*Hauler Trucks must slowed down in passing populated areas to minimize dust generation.</i></p> <p><i>*Wearing of mask or googles during hauling and cutting activities</i></p>			

		Noise generation	<p>*All heavy equipment / noisy construction activities shall be done during day time.</p> <p>*Implement proper maintenance of equipment and use of muffler for certain equipment.</p>			
	Water quality	<p>*Siltation of surface water bodies</p> <p>*Siltation of Drainage's or water ways from unconfined stock piles of soil and other materials</p> <p>* soil erosion</p> <p>*Used Oil spillage</p>	<p>* Sand bags can be used to line the drainage areas. This will help contain silt as well as reduce flow velocity.</p> <p>*Set-up temporary silt traps/pond along waterbodies to prevent siltation</p> <p>*Timber Stand Improvement or revegetation along rivers and creeks to harden and strengthen its stream bank and avoid soil erosion</p> <p>*Used oil must be stored in spill-proof and leak proof containers to avoid groundwater contamination.</p> <p>*spilled equipment lubricants must be properly segregated and disposed of to avoid accidental dispersal and possible contamination.</p>			
	People	*solid waste generation	*Conduct orientation to workers and its stakeholders for proper			

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		<i>*Employment generation</i>	<i>waste segregation and disposal of.</i> <i>*Schedule waste collection and coordinates to the nearest municipality material recovery facility.</i>  <i>*Hiring Priority shall be given to local inhabitants / host communities esp. the IP's</i>			
<b>Operations Phase</b>						
<ul style="list-style-type: none"> <li><i>Cutting and skidding</i></li> <li><i>Nursery management</i></li> <li><i>Plantation development</i></li> </ul>	Land	<i>*solid Waste Generation</i>	<i>*Implement regular waste collection and disposal system at site.</i> <i>*Implement re-use, reduce and recycle</i>  <i>*Identify temporary waste disposal within the project area for disposal of waste generated.</i>	MSCI, EMB, LGU	250,000.00	
	Air & Noise Quality	<i>*Dust generation</i>  <i>*Oil Spillage</i>	<i>*Regulated speed of vehicles especially in populated areas.</i> <i>*regular watering of unpaved roads or exposed soils/grounds</i> <i>*hauling trucks must have canvass or any materials of same kind to cover backloads.</i> <i>*Used Oil will be collected and stored in safe container to avoid spill over.</i> <i>.</i>			



		<p><i>Air Quality</i></p> <p><i>Burning of waste, refuse lubricants and used oil</i></p> <p><i>*Noise generation caused by hauling and transport vehicles and logging equipment.</i></p>	<p><i>*Heavy equipment and others shall be properly maintained and services to avoid gaseous emissions.</i></p> <p><i>*No burning of any solid waste wastes in bulk.</i> <i>*No burning of refuse lubricants and used oil.</i></p> <p><i>*All hauling and cutting equipment must be used only during daytime to avoid noise disturbance.</i></p>			
	Water	<p><i>*water quality degradation</i></p> <p><i>*siltation of water due to fallen debris or log wastes generated by cutting of trees near water bodies</i></p> <p><i>* Water Pollution due to use of chemicals/pesticides/herbicides</i></p>	<p><i>*Prohibit direct disposal of waste to water bodies</i></p> <p><i>*install sediments traps at the end of drainage channels</i></p> <p><i>*organic fertilizer should be used/applied as possible</i></p>			
	People	<p><i>*Income generation to local community</i></p> <p><i>*Increase in local tax collection</i></p>	<p><i>*Priority in hiring shall be given to local inhabitants</i></p> <p><i>*Regular and on time payments of forest charges, permits and others</i></p>			

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		<i>Forest Fires</i>	<i>*Formulate / implement programs on forest fire prevention and protection.</i>  <i>*Creation of Fire Brigade, First Aid, Traffic and Security Teams to spearhead immediate response and action during fire, accident, traffic and explosion risk/threat incident occurrences within the IFMA premises</i>			
	Noise	<i>*Noise generation due to site preparation / construction activities</i>	<i>*Schedule all construction, hauling and transport activities during day time.</i>			
<b>Abandonment Phase</b>						
	Land	<i>*Generation of solid Waste</i>	<i>*Proper segregation and disposal of waste</i> <i>*In the event of non-reproposedal, inform DENR / concern offices prior expiry of IFMA agreement / area abandonment</i> <i>*All standing facilities shall be turnover to LGU or to Cooperatives</i> <i>*An agreement shall be made and agreed with certain terms and conditions regarding the compensation of the existing developments and establishments in the area.</i>	MSCI, DENR	Part of Site Preparation and management cost	

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	Air	<i>*Dust generation</i>	<i>*Regular watering of unpaved roads until the area will be fully abandoned and turned over to DENR or Cooperatives via LGU</i> <i>*Remove muds/dirt from trucks</i>			
	Water	<i>No more significant impacts</i>	<i>*Few people will leave the site, remains only those local inhabitants, thereby waste will be minimized with no adverse impacts in the environment</i>			
	Noise level	<i>*Noise generated due to hauling and transport of equipment and materials</i>	<i>*Use mufflers to few vehicle unit to minimize noise</i> <i>*Limit the use of heavy equipment and schedule hauling and transport activities only during day time.</i>			

## **4. SOCIAL DEVELOPMENT FRAMEWORK/IEC FRAMEWORK**

### **4.1 General SDP**

As part of the company's Community Development Program, the company will assist the community by supporting the LGUs' projects in providing gender-responsive livelihood, through the conduct of medical missions, sponsorships in recreational activities especially during LGU festivities, and any other projects which the LGU will seek assistance with.

Through its existing Community Development Program, M&S has crafted and implemented agreements with communities and stakeholders for the provision of resettlement areas, distribution of rubber and coffee seedlings, farm Animals and implements to organizations, technical assistance to tribal communities to avail loans from financial institutions to finance their farm implements and uplift their living condition, assistance to Indigenous Peoples in the organization and registration of four (4) tribal communities, viz. Kalamansig Dulangan Manobo Tribal Assn., Kulaman Dulangan Manobo Tribal Assn., Sultan Kudarat Integrated Tribal Assn, and Esperanza Dulangan Manobo Tribal Assn.

Moreover, the Proponent also donates funds for construction of school buildings with chairs and amenities, gymnasiums, and provision of computers, books and references in schools. Through its Educational Outreach Program, school children from the IP community are provided school supplies. meals and subsistence allowance (in and out of school). The proponent also provides vocational training for free in Semirara Technical Training Center in Caluya Antique.

### **4.2 Indigenous People Development Plan**

The M&S Company shall ensure that the impacted resettlements of Indigenous Peoples are given priority in the consultation and decision-making process. The Project must, with absolute certainty, assure that IPs do not suffer adverse effects, during and after project implementation as well as receive culturally compatible social and economic benefits. The implementation of the Project shall continue to foster full respect for the Indigenous Peoples' dignity, human rights and cultural uniqueness.

The company recognizes the importance of the community residents as partners in the management, development and protection of all areas embraced by the IFMA. The company will continue to invest and embark on programs that will help alleviate the socio-economic conditions of the residents in the IFMA Area.

### **4.3 IEC Framework**

To inform the stakeholders about the project, the conduct of the information, education and communication campaign is deemed as very important. It is through this process that the stakeholder will also be able to receive feedback about the issues and concerns of the stakeholders about the project, as well as their suggestions and other inputs. Throughout the duration of the whole project, the M & S Company will inform the community of the operations to be conducted especially if it is near the area where the residents live in. They will also conduct regular IECs and dialogues with the community so as to ensure open communication.

## **4.4 Past Performance in Social Development**

This section presents the company's past performance in social development through lists, tables, and photos.

### **4.4.1 Education**

- a. Donation of school buildings with complete amenities including armchairs, blackboards with a total value of P22,357,059.00
- b. Educational Outreach Program for IP pupils with free school supplies, food and dormitory accomodation.
- c. Provide vocational training for free in Semirara Technical Training Center, Caluya Antique.
- d. Assorted books and references.
- e. Desktop Computers.

Donor: M&S Company, Inc.  
Donee: Kalamansig National High School  
Description: 10 rooms School Building (made of Bricks)  
Location: Poblacion, Kalamansig, S.K  
Year Donated: 2015



Donor M&S Company, Inc.  
Donee: Plamango Integrated School  
Description: 8 rooms School Building  
Location: Brgy. Pamantingan, Esperanza, S.K.  
Year Donated: 2014



The 2 school building with 2 classrooms each building donated by M&S Company Inc. at  
Sitio Tulale, Bagumbayan, S.K.





4.4.1.1 School Building Donation

Name of School	No. of Rooms	Year Donated	Cost	Location
<b>A. Municipality of Lebak:</b>				
1. Keytodak Elementary School	4	1992	300,000	Keytodak, Lebak, S.K.
2. Villamonte Municipal High School	6	1985	500,000	Villamonte, Lebak, S.K.
3. Lebak National High School	6	1995	640,872	Poblacion, Lebak, S.K.
4. Alalay Primary School	2	2014	900,000	Salangsang, Lebak, S.K.
			<b>2,340,872</b>	
<b>B. Municipality of Kalamansig:</b>				
1. Datu Guibar Memorial Central Pilot School	4	1987	380,000	Kalamansig, S.K.
2. Datu Guibar Memorial Central Pilot School(annex)	6	1987	500,000	Kalamansig, S.K.
3. St. Andrew Mission School (annex)	6	1993	650,000	Tinandoc, Kalamansig, S.K.
4. Notre Dame Of Kalamansig (2 storey)	8	1994	2,200,000	Kalamansig, S.K.
5. Sabanal High School	2	2014	500,000	Kalamansig, S.K.
6. St. Andrew Mission School (annex)	2	2014	500,000	Kalamansig, S.K.
7. Kalamansig National High School	10	2015	10,711,187	Kalamansig, S.K.
			<b>15,441,187</b>	
<b>C. Municipality of Esperanza:</b>				
1. Legodon Elementary School	1	1992	75,000	Legodon, Esperanza, S.K.
2. Plamango Integrated School	8	1997	2,000,000	Pamantingan, Esperanza, S.K.
	2	2014	500,000	Pamantingan, Esperanza, S.K.
3. Dapulan Elementary School	4	2007	600,000	Dapulan, Esperanza, S.K.
			<b>3,175,000</b>	
<b>D. Municipality of Bagumbayan:</b>				
1. Tulale Elementary School	2	1994	150,000	Tulale, Bagumbayan, S.K.
	2	2004	500,000	Tulale, Bagumbayan, S.K.
			<b>650,000</b>	
<b>E. Municipality of S.N. Aquino:</b>				
1. Kulaman National High School	6	1989	400,000	S. N. Aquino, S.K.
<b>F. Municipality of South Upi:</b>				
1. Itaw Elementary School	2	1994	150,000	Timanan, Upi, Maguindanao
<b>G. Municipality of Ampatuan:</b>				
1. Tubak Elementary School	2	1998	200,000	Ampatuan, Maguindanao
			<b>22,357,059</b>	

#### 4.4.1.2 Gymnasium Building Donation

Name of School	Gym	Year	Cost	Location
		Donated		
A. Municipality of Lebak:				
1. Notre Dame of Salaman College (Joint Venture of NDSC & M&S )	1	1992	657,862	Poblacion, Lebak, S.K.
B. Municipality of Esperanza:				
1. Plamango Integrated School Mini-gym	1	2015	1,000,000	Pamantingan, Esperanza, S.K.
			1,657,862	

#### 4.4.1.3 Chairs and Amenities Donation

Name of School	Chairs (pcs)	Year Donated	Cost	Location
<b>Municipality of Kalamansig:</b>				
1. Notre Dame Of Kalamansig	200	1991	24,000	Kalamansig, S.K.
2. Kalamansig National High School	150	1991	18,000	Kalamansig, S.K.
			<b>42,000</b>	
<b>C. Municipality of Esperanza:</b>				
1. Esperanza Municipal High School	350	1991	42,000	Esperanza, S.K.
2. New Panay Barangay High School	100	1991	12,000	Esperanza, S.K.
3. Salabaca Barangay High School	100	1991	12,000	Esperanza, S.K.
4. Plamango Integrated School	500	2000	60,000	Esperanza, S.K.
			<b>126,000</b>	
<b>D. OTHER SCHOOL:</b>				
1. Milbuk High School	200	1991	24,000	Palimbang, S.K.
2. Lambayong National High School	200	1991	24,000	Lambayong, S.K.
3. Tacurong Municipal High School	500	1991	60,000	Tacurong, S.K.
4. Notre Dame of Isulan High School	50	1991	6,000	Isulan, S.K.
5. Isulan Natioanl High School	300	1991	36,000	Isulan, S.K.
			<b>150,000</b>	

#### 4.4.1.4 Computers

Name of School	Computer set	Year Donated	Cost	Location
<b>A. Municipality of Lebak:</b>				
1. Salangsang Barangay Council	1	2015	0,000	Salangsang, Lebak, S.K.
<b>B. Municipality of Kalamansig:</b>				
1. Sabanal National High School	1	2015	0,000	Kalamansig, S.K.
2. Notre Dame of Kalamansig High School	10	2015	00,000	Kalamansig, S.K.
<b>C. Municipality of Esperanza:</b>				
1. Plamango Integrated School	6	2014	20,000	Pamantingan, Esperanza, S.K.
			<b>60,000</b>	

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1. MEALS & SUBSISTENCE			
	STAY IN	STAY OUT	TOTAL
A. PLAMANGO	60	101	161
B. KOSTARICA	55		55
TOTAL	115	101	216

STAY IN	- 115 PUPILS X 37.00 X 22 DAYS/MONTH X 10 MONTHS	936,100.00
STAY OUT	- 101 PUPILS X 16.00 X 22 DAYS/MONTH X 10 MONTHS	355,520.00
		<b>1,291,620.00</b>

2. SCHOOL SUPPLIES			
A. PLAMANGO INTEGRATED SCHOOL			
GRADE	NO. OF PUPILS	BUDGET/PUPIL	AMOUNT
KINDER	10	518.65	5,186.50
GRADE 1	10	462.65	4,626.50
GRADE 11	14	518.56	7,259.90
GRADE 111	14	852.85	11,939.90
GRADE 1V	14	681.85	9,545.90
GRADE V	11	602.49	6,627.35
GRADE V1	16	667.41	10,678.60
GRADE V11	61	824.38	50,287.35
GRADE V111	23	961.05	22,104.05
GRADE IX	20	957.45	19,149.00
GRADE X	14	988.42	13,837.90
	<b>207</b>		<b>161,242.95</b>

B. KOSTARICA ELEMENTARY SCHOOL			
GRADE	NO. OF PUPILS	BUDGET/PUPIL	AMOUNT
KINDER	2	255	510.00
GRADE 1	9	255	2,295.00
GRADE 11	7	255	1,785.00
GRADE 111	9	255	2,295.00
GRADE 1V	14	250	3,500.00
GRADE V	14	273	3,815.00
GRADE V1	10	273	2,725.00
	<b>65</b>		<b>16,925.00</b>

2. OTHER SCHOOLS - SCHOOL SUPPLIES ONLY												
	TULALI	DATAL	DAPULAN	LEGODON	BONGO-BONGO	TUDI	KITAKAL	SANGHAL	KANALAN	TOTAL	BUD PER STUDENT	AMOUNT
KINDER	51	15	33	19	41	25	3	7	11	205	194.88	39,949
GRADE 1	31	12	12	21	45		14	16	11	162	198.86	32,215
GRADE 11	23	9	20	33	24		23	30	15	177	198.43	35,122
GRADE 111	18	11	21	28	31		8	2	22	141	201.57	28,422
GRADE 1V	30	15	20	20	43		6	5	18	157	204.00	32,028
GRADE V	29	22	27	31	59		7	7	23	205	229.71	47,091
GRADE VI	22	14	36	33	44		3	3	15	170	223.43	37,983
	<b>204</b>	<b>98</b>	<b>169</b>	<b>185</b>	<b>287</b>	<b>25</b>	<b>64</b>	<b>70</b>	<b>115</b>	<b>1,217</b>		<b>252,810</b>



*Photo 0-1. The turn-over ceremony during the distribution of school supplies at Plamango Integrated School, Plamango Pamantaingan, Esperanza, Sultan Kudarat attended by NCIP Staff, District Supervisor, Brgy Captain, Sitio officials, tribal leaders and IP parents , School Year 2015-2016*



*Photo 0-2. The turn-over ceremony during the distribution of school supplies at Plamango Integrated School, Plamango Pamantaingan, Esperanza, Sultan Kudarat attended by Dr. Ruth Estacio (Assistant Schools Division Superintendent of Sulta Kudarat) and Staff School Year 2016-2017*





*Photo 0-3. The turn-over ceremony during the distribution of school supplies at Tulale Elementary School attended by the school in-charge, Brgy Captain, sitio officials, tribal leaders and IP parents, School Year 2015-2016*



*Photo 0-4. The turn-over ceremony during the distribution of school supplies at Saint Andrews Elementary School, Kostarica Kalamansig Sultan Kudarat Elementary School attended by the school in-charge, Brgy Captain, sitio officials, tribal leaders and IP parents, School Year 2016-2017*





*Photo 0-5. The turn-over ceremony during the distribution of school supplies at Sitio Proposed Datal Bunlangon, Brgy. Monteverde, Bagumbayan Elementary School attended by the school in-charge, Brgy Captain, sitio officials, tribal leaders and IP parents, School Year 2016-2017*



*Photo 0-6. The turn-over ceremony during the distribution of school supplies at Brgy Dapulan,, Esperanza, Sultan Kudarat Elementary School attended by the school in-chargeBrgCapy tain, sitio officials, tribal leaders and IP parents, School Year 2016-2017*

#### **4.4.2 Current Employment**

*Table 0-1. Number of Persons Currently Employed by M&S Company in the IFMA Area*

	Regular	Piece Workers	Harvesters	Total
Coffee Plantation (2016)	74	33	1,300	1,407
Durian Plantation	55	-	-	55
Palm Oil	5	20	-	25
Forest Plantation	14	183	-	197
Security	158	-	-	158
Admin	24	-	-	24
Total	325	236	1,300	1,866

About 70% of our plantation workers are IPs especially in the coffee plantation harvesting and forest tree plantation development.

#### **4.4.3 Livelihood**

M & S IFMA extended assistance in terms of the provision of the following:

- a. Coffee Seedlings Dispersals
- b. Farm Animals and implements
- c. Assist the tribal natives to organize and registered four (4) tribal communities to avail the dispersal of rubber tree and coffee tree seedlings from the company.
  1. Kalamansig Dulangan Manobo Tribal Assn.
  2. Kulaman Dulangan Manobo Tribal Assn.
  3. Sultan Kudarat Integrated Tribal Assn.
  4. Esperanza Dulangan Manobo Tribal Assn.
- d. Assist the tribal community to avail loans from financial institutions to finance their farm implements and uplift their living condition.



e. *Photo 0-7. NCIP staff with conducted validation process of EDUMATA Association*



## ENVIRONMENTAL IMPACT ASSESSMENT REPORT

## Forest Resource Utilization and Plantation Development Project Municipalities of Esperanza, Lebak, Kalamansig, Bagumbayan, and Senator Ninoy Aquino, All in the Province of Sultan Kudarat, Region XII



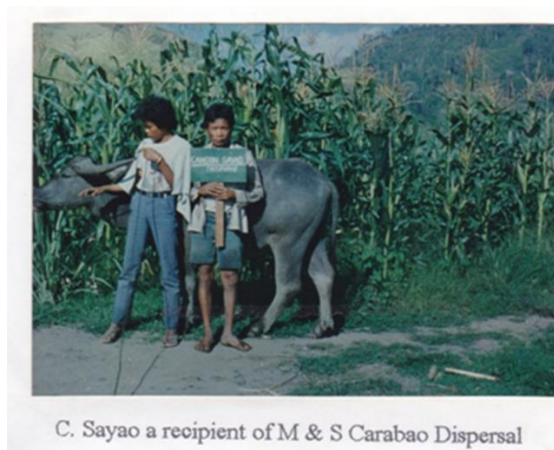
**KUDUMATA  
SEC Certificate**



**KADUMATA SEC  
Certificate**



**EDUMATA SEC  
Certificate**



**C. Sayao a recipient of M & S Carabao Dispersal**  
Canson Sayao, One of the Recipients of Carabao Dispersal Program at Sitio Blagkasi, Senator Ninoy Aquino, S.K.



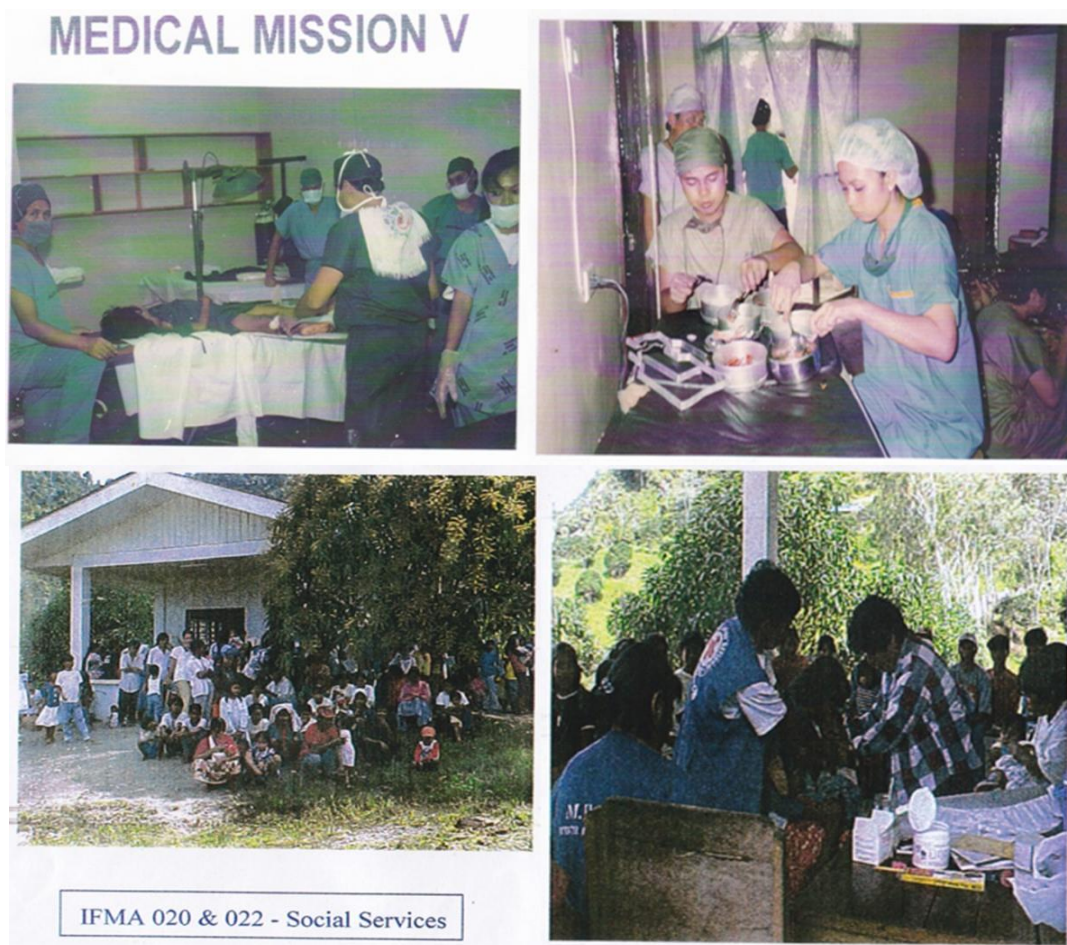
**Another Manobo recipient take a poise**  
Medyol Tubo, Another Manobo Recipient of Carabao Dispersal Program at Sitio Kued, Pamantingan, Esp. S.K.

### 4.4.4 Medical and Health Program

The company provide two (2) units health center with company nurse to cater health services to the community as well as company workers and dependents.

Six (6) Medical Missions have been conducted by professional physicians from Manila & Davao in Kalamansig, Sultan Kudarat sponsored by M&S Company Inc.

There were 350 patients consisting of 61 natives, 21 Muslims, and 267 Christians. Some patients were flown to Manila & Davao for surgery and operations at the expense of the company. Physicians and surgeons successfully have done their job in operations and surgery of THYROIDECTOMY, CATARACT EXTRACTION, HEAD MASS EXTRACTION, POLYPECTOM, EXPLORATORY LAP., EXCISION OF CYST and CONSULTATION.



*f. Photo 0-8. Past medical missions*

#### **4.4.5 Religion**

M&S Company has donated for the construction of a mosque as well as churches and chapels with complete amenities (toilet and pews).



*g. Photo 0-9. Roman Catholic Church at Barangay Dukay, Esperanza*





*h. Photo 0-10. Mosque at Lebak*

#### **4.4.6 Road Infrastructure and Maintenance**

About 210 kilometers of Main Road are maintained by the company which also serve a farm to market road of the different communities inside IFMA project.

The Company also provided construction materials and labor during installation of 10 units Steel Bridges



*i. Photo 0-11. Double-lane 'Tulay sa Pangulo' steel bridge at Cabulanan River, Sitio Plamango, Pamantingan, Esperanza, S.K.*



Two-barrel concrete spillway constructed January 2013 At Km. 28, Hinalaan, Kalamansig. S.K

#### ***4.4.7 Peace and Order***

The presence of the Company's CAA – II and deputized Forest Guard help in maintaining and stabilizing the peace and order situation in the community against lawless elements especially the animal thieves which is rampant in the community, protection of illegal poachers/loggers, and also some criminal cases within the area of responsibility.

Constant coordination of the company to the Philippine National Police, Military, Local Government Unit and related agencies are well implemented for monitoring and prevent the possible risk incident and lawless attack to equipment, people and environment.



## **5 ENVIRONMENTAL COMPLIANCE MONITORING**

The Environmental Monitoring Plan (EMoP) covers all phases of the Project from preparation through commissioning and operation, and aims to ensure the monitoring of environmental impacts and the implementation of environmental mitigation measures. (see Table 16)

### ***5.1 Self Monitoring Plan***

The M & S Company commits itself to the regular monitoring of its operations so as to ensure that no adverse impacts will be made by the Project to the environment. Areas to be monitored are the following:

- (1) Solid waste generation in the Camp sites and production area
- (2) Water quality of the rivers and creeks in the area
- (3) Air ambient in camp site and production area

See succeeding page for the Environmental Monitoring Plan (EMoP) with Environmental Quality Performance Levels (EQPLs).

### ***5.2 Multi-Sectoral Monitoring Framework***

This project requires the formation of a Multi-Sectoral Monitoring Team to regularly monitor the Project's compliance with the DENR-issued Environmental Compliance Certificate and the Environmental Management Plan Commitments. The MMT will ensure that the identified and committed appropriate and effective environmental impact remedial actions or mitigation measures are implemented at all times.

The MMT will review and validate the Self Monitoring Reports submitted by the Proponent on a quarterly basis, the validation of the water and air quality and the company's management of wastes.

Likely members of the MMT are: EMB-Region 12 Representative, DENR-Region 12 Representative, CENRO-Tacurong Representative, M & S Company Management Representative, LGU Lebak, Kalamansig, SNA, Bagumbayan and Esperanza representatives, Municipal IPMRs, tribal chieftains, and the National Commission on Indigenous Peoples.

Functions of MMT are as follows:

1. Monitor project compliance with the conditions stipulated in the ECC and the EMP;
2. Validate proponent's conduct of self monitoring
3. Receive complaints, gather relevant information to facilitate determination of validity of complaints or concerns about the project and timely transmit to the proponent and EMB recommended measures to address the complaint;
4. Prepare, integrate & disseminate simplified monitoring reports to community stakeholders
5. Make regular and timely submission of MMT Report based on the EMB-prescribed format

The EMB Central Office shall be responsible for taking the lead in policy guidance, resolution of issues where consensus or decisions cannot be made at the regional level, the provision of needed support for the operationalization of the MMT and MMT Performance validation.

Other member offices/sector identified as needing representation in the MMT shall have the following roles, duties and responsibilities:

*EMB Regional Office shall designate a representative who shall assure strict adherence with the policies and implementing rules and regulations governing the formation and operationalization of the MMT and shall initiate transmittal to the EMB Central Office for resolution, regional or project specific issues where consensus or decisions cannot be made at the regional level. (In the case of the presence of field units or personnel in charge of areas/site hosting the project, the EMB RO may designate personnel to lead the SMT instead of the PENRO or CENRO) DENR-Provincial Environment and Natural Resources Officer (PENRO), the DENR-Community Environment and Natural Resources Officer (CENRO) or the EMB-RO Personnel in charge of the areas/site hosting the Project shall lead the SMT organized by geopolitical units in undertaking actual monitoring activities and act with dispatch on issues/problems that arise relative to the PROJECT being monitored. (In case of the presence of EMB field unit or personnel in charge of area/site hosting the project, the EMB RO may designate its personnel to lead the SMT instead of the PENRO or CENRO)*

The M & S Company Management shall provide necessary budget/funds for the MMT activities, make available to the MMT all project information necessary to determine compliance with the environmental requirements and commitments to the extent that such information is not subject to any restrictions and confidentiality, coordinate with and allow the MMT members to inspect and observe construction and operation activities of the Project including the testing, calibration and operation of pollution control and in-house monitoring equipment.

*LGU Lebak, Kalamansig, SNA, Bagumbayan and Esperanza shall designate a representative who shall participate in actual monitoring work, prepare or concur with and sign the MMT monitoring reports, provide the necessary information about local policies, plans and programs affecting MMT monitoring results and standards, advise the MMT of any complaints, information or reports from LGUs concerning the PROJECT.*

The IPs may designate the tribal chieftain to participate in actual monitoring work, prepare or concur with and sign the monitoring reports, provide the necessary information such as update regarding the perceptible impact of the project on the sector/concern being represented.

### **5.3 Environmental Guarantee and Monitoring Fund Considerations**

#### **5.3.1 Environmental Monitoring Fund**

The EMF is a fund that the proponent shall commit to establish to support the activities of the MMT as described in the EMB-approved Annual Work and Financial Plan (AWFP).

M & S Company Management shall arrange the opening of an account in a reputable bank in the country for the EMF within ten (10) banking days after the effectivity of the Agreement, the amount of *ONE HUNDRED THOUSAND PESOS (PHP 100,000)* to finance the initial organizational activities of the MMT for the PROJECT.

The Interest shall accrue to the same fund. Replenishment of this amount shall be done by the proponent regularly to correspond to the EMB-approved annual work and financial plan.

The EMF shall be exclusively utilized to cover all costs attendant to the operation of the MMT and disbursed in accordance with the guidelines stipulated in the approved MOO. The EMF shall be managed and administered by *[duly elected/appointed fund manager-MMT member organization who has an acceptable and operational financial accounting system]* in accordance with the MMT MOO and annual work and financial plan.

A separate bank account of the EMF shall be established. The signatories shall be the designated MMT Chairman and Vice-chairman. The MMT Secretariat shall undertake the accounting of all expenses by the MMT which the Exec Com/ Officers shall oversee

An external auditor may be commissioned by the MMT, proponent or EMB to conduct audit on the expenditure/disbursement of EMF in accordance with applicable rules and guidelines.

### **5.3.2 Environmental Guarantee Fund**

Moreover, an Environmental Guarantee Fund shall be established and used exclusively for the following purposes:

1. The immediate rehabilitation of areas affected by damages to the environment and the resulting deterioration of environmental quality as a direct consequence of project construction, operation and abandonment;
2. The just compensation of parties and communities affected by the negative impacts of the PROJECT;
3. The conduct of scientific or research studies related to the PROJECT that will aid in the prevention or rehabilitation of accidents and/or environmental damages; and
4. For contingency clean-up activities, environmental enhancement measures, damage prevention programs and social equity measures (e.g. livelihood, social development programs) including the necessary IEC and capability building activities related to the PROJECT.

There shall be two (2) components of the EGF as follows:

#### **5.3.3 EGF Trust Fund**

The *M&S Company* shall open an account for the Trust Fund in the amount of *proposed amount of FIVE HUNDRED THOUSAND PESOS (PhP 500,000.00)* in the form of *bank guarantee*, the earnings/interests of which shall accrue to the same Fund. The Trust Fund will be used to compensate aggrieved parties for any damages to life or property, undertake community-based environmental programs, conduct environmental research aimed at strengthening measures to prevent environmental damage and to finance restoration and rehabilitation of environmental quality of the project-affected area.

The Trust Fund shall be replenished to its original amount annually or whenever the amount goes below Php 500,000.00. The Trust Fund shall also be repropounded upon every expiration. The proponent shall immediately inform EMB Central and RO should it fail to repropounded the Trust Fund (e.g. insurance policy) on its stated expiration date or should the Trust Fund be cancelled or voided by the Insurer because of non-payment of the required premiums or any other cause allowed by the Insurance Code or pertinent issuances of the Insurance Commission.

#### **5.3.4 EGF Cash Fund**

The *company* shall open an account for the Environmental Guarantee Cash Fund at a reputable bank in the area in the amount of *TWO HUNDRED THOUSAND PESOS (PhP 200,000.00)* which shall be earmarked for immediate rehabilitation and compensation of affected communities in case of damage or accidents. It shall also be used to cover the operational costs of the EGF Committee. This Cash Fund shall be placed in an interest-bearing account and such interest shall accrue to the same Cash Fund. The Fund shall be replenished to its original amount annually or whenever the amount goes below 50% of the amount.

Provided, further that in the event of insufficiency of both the EGF Trust Fund and the EGF Cash Fund to answer for expenses, the Proponent shall shoulder the amount of any such insufficiency.

## **6 ABANDONMENT/DECOMMISSIONING/REHABILITATION POLICY**

At the end of the project lifecycle, M & S Company shall implement an Abandonment/Decommissioning Plan which complies with relevant government regulations, mitigates environmental impacts and minimizes the socio-economic impacts to the employees and affected community. Towards this end, an assessment of the impacts associated with the closure will be made and a plan for potential land uses at the end of the project life will be developed in consultation with the community.

The management will make sure that no structures are left behind that can affect safety and water quality from abandoned logging and plantation area and facilities. Before the implementation of abandonment activities, the LGUs concerned will be informed ahead of schedule.

The M & S Company shall ensure that all materials will be removed and any land contaminated with oily wastes/garbage will be cleaned/remedied.

## **7 INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION**

The management shall designate an Environmental Team which shall ensure the implementation of pollution-control related plans and programs. In coordination with the M &S management, the team will be responsible for the formulation of detailed strategy and plans of action that will respond to the requirements of the Environmental Management Plan and the future needs relevant to environment protection. The team shall handle the overall management and planning of activities that will respond to environment-related issues and concerns that may arise during the construction and operation phases of the Project.

The team leader is the Pollution Control Officer who will be tasked to represent the Project Proponent in coordinating with the DENR Regional, Provincial and Municipal Offices on matters related to environmental concerns. This is in compliance with DAO 2014-02 and other relevant laws, rules and regulations.

The Pollution Control Officer shall have the following responsibilities:

1. Attend to the requirements of the establishment or agency prior to the construction or installation of pollution control facilities including the application and securing of necessary pollution permits and repropoedals thereof;
2. Monitor activities pertaining to the installation or construction of pollution source and control facilities with the end in view of ensuring their compliance with the air, noise and water quality standards; the PCO and the head of establishment shall be held responsible for any violations of PD 984 and its implementing rules and regulations committed by establishment where the officer is employed;
3. Supervise the proper operation and maintenance of pollution control facilities of the company;
4. Report within reasonable time to the Department the breakdown of any pollution control facility, and the estimated and actual date of completion/repair and operation;
5. Promptly submit validated/certified as correct by the General Manager periodic reports as stipulated in Section 7 hereof or as required by the Department (otherwise, said reports shall not be accepted as evidence in a pollution case); (
6. As a liaison officer with the DENR, he shall keep himself abreast with the requirements of the Department and the latest available technology on the prevention, control and abatement of pollution;
7. Maintain liaison with the city/provincial/municipal or local pollution control officers;
8. Attend the meetings for Pollution Control Officers which may from time to time be called by the Department;
9. Facilitate compliance of M &S Company with the requirements that may from time to time be prescribed by the DENR;
10. Recommend to the management the installation and operation of additional equipment for the pollution abatement facilities; and
11. Handle other matters of environmental concern as required by M & S Company.

## **8 REFERENCES**

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## **9 ANNEXES**

- ANNEX A - Approved IFMA No.18-2007 under M&S Company inc.**
- ANNEX B - Approved IFMA No. 022**
- ANNEX C - Approved Integration of IFMA No. 022 into IFMA 18-2007**
- ANNEX D - Individual IFMA No 022 prior Integration to IFMA 18-2007**
- ANNEX E - Documentation of Scoping and Participation**
- ANNEX F - Terrestrial Sampling Site Map**
- ANNEX G - Water Sampling Site Map**
- ANNEX H - Air Sampling Site Map**
- ANNEX I - Distribution of Active Faults and Trenches in Region XII**
- ANNEX J - Active faults and Liquifaction Susceptibility Map of Region XII**
- ANNEX K - Soil Map of the Philippines**
- ANNEX L - Water Quality Laboratory Test Results**
- ANNEX M - Ambient Air and Noise Quality Test Result**