# Forest Resource Utilization and Plantation Development Project

## ENVIRONMENTAL IMPACT ASSESSMENT REPORT

M & S Company Inc.

February 2020

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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 | *The IFMA 18-2007 original area of 1,555 hectares was approved in the year 2007 but pending its release, until the M&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.<br><br>*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.<br><br>*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<br><br>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. |

<table>
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<tr><th>Present Land Use/Vegetative Cover</th><th>Area<br><br>(has)</th><th>Development and Management Strategies</th><th>Allocation of area (has)</th></tr>
<tr><td>Production Residual<br><br>Forest (PRF</td><td>2,116</td><td>* 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.<br><br>* Maintain as production natural forest.</td><td>2,116</td></tr>
<tr><td>Degraded Residual<br><br>Forest (DRF)</td><td>12,038</td><td>*Develop and manage into industrial forest plantation based on the exemption of E.O 23.<br><br>* develop as protection or buffer zone forest.</td><td>9,823<br><br>2,215.00</td></tr>
<tr><td>Established Plantation</td><td>10,442</td><td>* Continue protecting and managing as forest trees plantation</td><td>10,442</td></tr>
<tr><td>Cultivated/ Agroforestry Areas</td><td>1,043</td><td>* 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.</td><td>1,043</td></tr>
<tr><td>Open / Brush Land</td><td>2,713</td><td>* Maintain as productive cultivated /agro-forestry area.<br><br>* Develop into mix fruit tree plantation and palm oil or rubber trees plantation.</td><td>2,713</td></tr>
<tr><td>Resettlement Area</td><td>733</td><td>* Manage in place and resettled forest occupants.</td><td>733</td></tr>
<tr><td>TOTAL</td><td>29,085</td><td></td><td>29,085</td></tr>
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<tr><td>Components</td><td>• Road Network Rehabilitation / Maintenance<br>• Harvesting of Matured Forest Trees Plantation</td></tr>
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| | |
|---|---|
| | • Harvesting of Degraded Residual Forest based on item 2.2 of E.O 23 guidelines<br>• Selective Logging System and Enrichment Planting or Timber Stand Improvement for Production Residual Forest (Once E.O 23 is lifted)<br>• Nursery development<br>• Plantation Development<br>• Forest Protection and Maintenance<br>• Infrastructures development and maintenance<br>• Community Development |
| Process / Technology | 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.<br><br>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. |
| Products | Timber |
| Major Waste Streams, Types & Estimated Generation Rate | Logging residue (slash, stumps) – Approx . 50% of biomass |
| Manpower Requirement | Operations Phase – Male 482; Female 123<br><br>Abandonment/Decommissioning Phase – Male 188; Female 5 |
| Project Investment Cost | **Php 6.5 Billion** |
| Project Duration and Schedule | Remaining 14 Years of 25-year IFMA: CY 2019 to CY 2032<br><br>Operations Life: 25 years and renewable for another 25 years thereafter<br><br>IFMA Expiry: December 31, 2032 |

## B. EIA Process

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

### ***EIA Team***

| Name | Expertise | Module Assigned | DRRCC-Trained |
|---|---|---|---|
| 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 counterpart | 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 exisitng 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***

| Activity | Period Covered | Weather/ Season | Area |
|---|---|---|---|
| Site Inspection | August 26, 2018 | Rainy | Esperanza, Lebak, Kalamansig, Bagumabayan and Sen Ninoy Aquino |
| Terrestrial Flora and Fauna Assessment | August 27 – 31, 2018 | Rainy | Esperanza, Sen Ninoy Aquino and Lebak |
| Socio-economic & cultural research | August 27 – 31, 2018 | Rainy | Esperanza, Sultan Kudarat |
| Public Scoping | August 30, 2018 | Rainy | Esperanza, Lebak, Sen. Ninoy and Lebak |
| Public Participation / IEC | March 26-30, 2019 | Sunny | Esperanza,Lebak, Bagumbayan and Sen Ninoy Aquino |
| Air Quality Assessment | April 26, 2019 | Sunny | Esperanza and Lebak |
| Water Quality Assessment | October 24, 2018<br>May 2019 | Sunny<br>Rainy | Esperanza and Lebak |

## ***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 *E. coli* |
| 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.**

| Date | Activity | Stakeholder/ Community | Issue | Proponent's Comments/Response |
|---|---|---|---|---|
| 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 plantions 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 Catolic 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 | |
| **Date** | **Activity** | **Stakeholder/ Community** | **Issue** | **Proponent's Comments/Response** |
| August 27, 2018 | Focus Group Discussions | Tribal Leader - Barangay Margues | Benefits from M&S Company - free 'bukag' or basket, other farming | |

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| | | | 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 cofee | |
| | | 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 looding. Only plantation trees harvested. Natural forest protects aginst flooding. |
| | | Female resident - Salumping | Employment opportunities for women | .Women are preferred for nursery operations, especially IP |
| | | Female resident - Pamantingan | Sufficient seedlings for planting | Yee, we have sufficient seedlings in the nurseries ready for planting |
| | | Tribal Leader – Margues | Positive remarks on project employment opportunities | Thank you |

| Date | Activity | Stakeholder/ Community | Issue | Proponent's Comments/Response |
|---|---|---|---|---|
| March 26, 2019 | IEC / FGD | Edgar Arguelles Senator Ninoy Aquino, Barangay Kagawad,<br>- 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 constituents involved in forest destruction that is outside of the M&S IFMA area. | 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 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. |
| | | **Barangay Government Unit Sector** | *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 | Proper documentation and requisition of |

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| | | | limestone, we are experiencing scarcity of water source for drinking water, thus we need a sufficient drinking water supply in our barangay.<br><br>*We targeted to acquire for a water tanker that will distribute water from household to household. | concerned shall be forwarded along with a barangay resolution. Issues were noted for presentation to the management. |
| | | 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 |
| **Date** | **Activity** | **Stakeholder/ Community** | **Issue** | **Proponent's Comments/Response** |
| 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. |
| | | **Integrated School, Head,** 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 | *CENRO Ali Sampal advised Mr. Castro to bring his copy of cutting permit |

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| | | | an issuance of total log ban. Since, log ban for plantation was lifted, he wants to get a permit.<br><br>*Chainsaw registration, stated pruning, instead of cutting permit. | application to DENR for appropriate action, endorsement and approval.<br><br>*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.<br><br>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 | *request planting materials such as any fruit trees like durian to gain economic benefits to my constituent.<br><br>*Rehab Building for Barangay Request<br><br>*assistance for a suitable road from farm to market road, | *Instead of Durian, the company can provide high yielding Vietnam Robusta coffee to avoid incidents of marketing struggles that are presently experienced in Durian.<br><br>*To Submit Barangay Resolution for said request |
| **Date** | **Activity** | **Stakeholder/ Community** | **Issue** | **Proponent's Comments/Response** |
| March 30, 2019 | IEC / FGD | IP Representative, Timbog Sandigan, Brgy. Sto. Nino, | Can we plant our Coffee Trees inside Forest Area in Barangay Sto, | IPs are no longer allowed to establish coffee plantation within the IFMA Area. |

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| | | Bagumbayan | Nino | Otherwise it will be a precedent for girdling of trees by IPs to give more way for direct sunlight to their coffee trees.<br><br>M&S can provide planting materials for the IPs to be planted outside the IFMA premises |
| | | 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 transportation in attending Seminars and other Religious activities held outside | Prepare a request prior to the conduct of 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 |

| EIA Module | Name of Stakeholder | Issues/Concern | Proponent's response |
|---|---|---|---|
| **Public Hearing Day 1** | | | |
| Land, People | Datu Andy Pipayan Tribal Leader, Sitio Legodon | *no plans of opposing to harvesting / operations of M&S on their plantations in Esperanza. | *Harvesting operations of the company is a 5-year program. The 5-year |

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| | Brgy Marguez, Esperanza | *Identify people inside the IFMA area prior start of harvesting<br>*We acknowledge that the company has given us so much.<br>*We will continue to support and there are no issues, except that we wanted the people to be secured first inside the area. | program is already scheduled accordingly for year 1, year 2, 3, 4 and 5. This project already has a program and will be announced to the affected barangays or constituents.<br>*Identified people settling in Omega area. |
| Land, People | Insular Pipayan, Tribal Leader, Sitio Legodon, Marguez, Esperanza | *We are not against the IFMA, if they will continue or renew.<br>*We know, there is a comprehensive process either in DENR or NCIP.<br>*We just wanted to clarify the areas for IP within IFMA area. How we can use the IP areas that is inside IFMA. As the IFMA operates for 25 years, the IP population increases inside IFMA area. | *Management waited for Census to get the actual original relocated settlers and to verify to our existing lists whether, the listing submitted by the barangays are the original settlers and not the outsiders who just want to live inside the IFMA area. |
| People | Sultan Rey Dakyas, Municipal IPMR Esperanza, Sultan Kudarat | *What is the primary benefit the Manobo Dulangan who are inside the IFMA area will get when the company start to harvest their planted trees? | *Priority of hiring are the locals especially the IP's. |
| | | | *M&S guarantee's the employment opportunities for IPs.<br>*Demand for royalty must be proposed and come from the tribe, thru census. You didn't submit the percentage to the company." |
| People | Sultan Rey Dakyas, Municipal IPMR Esperanza, Sultan Kudarat | *IP's of Apo Dululangan are happy of the answer gotten from Rolando Baloria. It's not yet, too late.<br>*The M&S help meets the second generation of the IP's.<br>*The IP's did not demand to the company, only on what M&S can do and guarantee esp. those IPs within its IFMA area since, their economic will be affected.<br>*Not all Manobos outside the IFMA, the M&S could be able to help.<br>*We know the help of M&S are not secret in Senator Aquino. | *the company will be use limited equipment in harvesting operations as they will focus on manual labor, thus requires huge manpower.<br>*It generates employment and economic activity inside the IFMA area particularly to the IP's. |
| Land | Arnold Sitjar, Punong Barangay, Kuden, Sen. Ninoy Aquino | *With regards to identified resettlement area, how big is the resettlement area that is covered under our barangay? And when it comes to existing planted coffee as well as planted trees, does the company will replace the trees | Julius Aborido, Forester answered that "Sitio Tamangan is inside the IFMA area. And the company will replant trees as this is the mandate of DENR. The company will cut and plant |

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| | | once it is harvested? Does the farmer can still plant coffee after the harvesting of trees? Also, we have 5-year medium term development plan in the barangay wherein we were able to identify farm to market road where we have community within the IFMA area. Can we use the spur roads after harvesting operations as farm to market roads? | the trees. And its 25 years. While, you, are lucky, because your coffee will still be there. There is three years more before we can harvest. Regarding to spur lines, we need to get clearance from the management." |
| | | | *Tree Plantation comes first before the coffee.<br>* Robusta coffee favors good growth under shade by the trees, while arabica coffee, is different to robusta. And most IPs even Christian planted coffee under shades the planted trees. Now, the problems arise where the NPA's use it against the company as they say we damage the coffee trees and pulled it down.<br>*M&S seeks legal process and come to community meetings with IPs involved, with the mayor and even with the military presence. Various agreements were signed and even the IPs have uttered apology to M&S in planting coffee. They committed to us that they will not charge us nor ask for compensation for damages. As proof, we have various memorandum of agreements signed with in the LGU, and other government agencies. The company will cut and replant. But we will try our best not to damage the coffee during harvesting operation. |
| People | Arnold Sitjar, Punong Barangay, Kuden, Sen. Ninoy Aquino | *Increase in population cannot be avoided due to inter-marriage.<br>*Request appropriate action to determine the original settlers inside IFMA area. | *There is no problem. But should take it a one-time approach together with involved parties for a one-time take up to the management with our recommendation. |
| Land | Sultan Rey Dakyas, Municipal IPMR Esperanza, | * If it is not through the protection done by the M&S, the ancestral domain of the IPs has long been | *Thank you for recognizing the company.<br>*TAMASCO has 1,611 |

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| | Sultan Kudarat | denuded, lease or sold by the IP's. If we have good mouth, good in talking, we must also good in tilling our lands. | hectares wherein the 310 hectares of Block 5 of the M&S IFMA area was covered under their CADT claims. 80% of that block 5 was inside TAMASCO and it is the only remaining area that has not been sold by the IPs. All other areas covered by TAMASCO were already sold. We can give you proof, if you wanted to see it. |
| Land | Agustino Fajardo, Teacher In-charge of Tulale Elementary School, Bagumbayan | *Implement every year a tree planting.<br>*Don't have enough seedlings. But if you will give us for FREE, we will really appreciate it. | *We can give you seedlings for planting. But because the area is very far, we will raise seedlings thereat intended for your project. |
| Land | Agustino Fajardo Teacher In-Charge DepEd, Bagumbayan | *We have about Four (4) trees. Pine trees, mangium. Based on the hazard mapping, it is very big and is hazardous and poses risk to pupils. Does this trees will be included in the cutting of trees? | *Even though it is inside the IFMA, and your concern is to cut the hazardous trees. We are not authorized to give permit. Still it is with DENR. Even if, that trees is yours, and it is inside the IFMA area, still we cannot give clearance and even give permit. |
| Land | | | *It is true that it is not covered by us, but we can assist you. You may prepare a letter request regarding tree cutting. The documentation is yours, but we can help guiding you on how to apply a tree cutting permit. The request must come from Deped, not from us. |
| Land | Alexander Espinosa, TIC Elementary School of Monteverde, Bagumbayan. | *Who is the legitimate concern who can give us the Deed of Donation so we can develop our area?<br>*Can we do partnership with M&S and ask for planting materials of forest trees, if possible. | *We don't have clear guidelines, as we are not the owner. |
| | | | Dir. Omar Saikol, EMB Regional Director, Region 12<br><br>There is what we called special patent. You apply in the Regional office of DENR not EMB. Since it is a government institution, you can apply for special patent at PENRO. Immediately the PENRO will facilitate. |

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| Land | Sheilla Rollorata<br>Teacher In-Charge<br>Plamango Integrated School | *Concern about school site documentation. We went to DENR but we are told to go to the NCIP. Made several meetings but the result still vague. I forgot since it has been so long, I only have this certificate issued by the NCIP. | On our side as IFMA Holder, we can assist the school by relinquishing the school site covered within the IFMA area. |
| People | Arnold Sitjar,<br>Punong Barangay, Kuden, Sen. Ninoy Aquino | *Pertains to the housing project of NHA which are being implemented in our Barangay, particularly in Sitio Tamangan, Brgy Kuden which is inside IFMA area. We have difficulty in the implementation since there is existing planted trees. We have problems in the implementation since there is no good roads for transportation by the proponent and the IFMA, what is the best thing to do esp now that we are on-going in the project implementation?<br><br>The proponent is the LGU, and the recipient is the Manobo Dulangan Tribe in Sitio Tamangan. | *We would like to clear that the IFMA is supporting the project and we are not against.<br>*We support because that is for the benefit of the IPs.<br>*There are requirements for conversion of forestland into resettlement or residential and we have submitted all the requirements to the LGU which you have to comply.<br>*We have to be compliant, because, as IFMA, we will be questioned since the project is within the IFMA area. So again, we are supporting the project but there are those requirements that we need to comply first. |
| | | | Director Omar Saikol added:<br>What he said is correct on the management side of M&S. Before we can proceed the project in forestland, we need to convert it into alienable and disposable. In conversion, the basic requirement is for the congress to enact a law converting forestland into alienable or disposable or agricultural land. So I advise you, this is a concern of DENR. This is under jurisdiction of Region 12. Just go to Aurora and you will know what should be done. A little bit complicated because this is IFMA. I just want you to be informed that the basic requirement is for the congress to enact a law converting forestland into Alienable and Disposable. |
| Land | Julito Inion<br>Brgy. Captain<br>Sto. Nino, | *Related to IFMA integration, part of Bagumbayan, there are about 310 hectares, very little. But | *It is possible.<br>*It is stated in the terms and conditions, if public |

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| | Bagumbayan | because on the current issue on TAMASCO claim covered inside the IFMA, is there any possibility that it can be awarded or released by M&S about their claim inside the area of IFMA 18-2007? | demands, it is possible. But also stated in the terms and conditions, that the IFMA can ask for due compensation. Whatever development, whatever is existing, it has to be compensated before they can release the area to the people. |
| Land | Kagawad Felomino Ngag, Lebak | Does the natural forest will be cut or only planted trees? | *The company scheduled to harvest for planted species. We will not harvest the natural species. Only the planted species such as acacia mangium, gmelina. Only those planted by the company. |
| **Day 2** | | | |
| Land | MPDC Kalamansig | *There was a lot of complain previously because of damage agricultural crops, what is our policy that the sanguniang bayan need to know, to have a clear interpretation. Sometimes, it is very good in written but doesn't interpreted well or doesn't apply in the implementation. We wanted, for documentation, we need to identify and state within the map. We need to have a map and interpret properly in the map, the limitation and coverage of the new system. It is very important to spell out. Sometimes this is the boundary but they operate on the other side. Clear this with DENR and municipal government. | *Our harvesting operations, once, we will be granted with ECC, we will cut only the planted trees. Previously, we have one-year operation in 2014-2015 and the area were in Lebak and Kalamansig. Now, we program for Four (4) year harvesting in Senator Ninoy Aquino and Esperanza only.<br><br>The system is, mostly we are on labor force. Man Labor or Carabao labor. It requires a lot of people. |
| Land, People | | *To have clear mechanic on harvesting, since there were agricultural crops planted underneath, and slightly disadvantageous. Let's clear what are the conditions we can give to the people who are covered underneath. What could you offer to them or is it already owned by the IP's or lead by the? This must be discussed properly and clear what should be done. So they will know their position. The LGU, in the monitoring and evaluation. It is important to check their harvest. Whether they harvest the natural or plantations. | *For the information of the Visayan, those harvested before were already replanted because the company policy is to CUT and PLANT. The company reached the quota attending several meetings. The company before they harvest the trees, what the natives did, they planted coffee underneath the plantations. When the trees aged 4 years, underneath the plant is already clean and very suitable for planting of coffee trees. We have to admit, that the plantation comes first before the coffee |

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| | | | trees. Let's look back your IPRA Law, section 56 of IPRA Law states that IFMA holder, included there, has prior rights that must be recognized and the same be respected. If you respected the IFMA rights, the IFMA holder, the IP's must not enter. If being respected, they must not enter in the IFMA area to plant the coffee trees. But let us disregard that. Previously, our manager, as the trees grows, we keep our eyes closed. We know they are planting coffee underneath. We didn't expect that during harvesting of trees, the coffee trees will be hit. There started the issue on compensation. How many times, but the company's stand is, the trees comes first. You inter-planted coffee. If we keep coming back on the issue, it comes to unending story. Now, the DENR program is to cut and plant. The company will start the cutting of trees and will avoid as much as possible damaging the coffee trees. We commit to the barangay, that we will finish the season of coffee before we will harvest to avoid great damage. But if needed, better off that you will pruned at the same time while we do cutting activity so you can recover again. The company will not compensate, since you did not asked clearance to interplant coffee before. Please do understand also the management side, that the company must also recover from its expenses in plantation development. Before, the DENR did not tell that MR Consunji stop planting because it is not sure if you can harvest |

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| | | | because of banning. surely, the company will not plant trees. |
| Land, People | | | *In additional with regards to the monitoring of LGU, part of the ECC is to create a multipartite monitoring team. We can have it inserted. We will just wait in the coming…after it will be done. We will implement it. |
| Land, People | Kagawad Boy Ansep | *Limulan and Hinalaan has 3,000 plus of CADT. Then the IFMA there has more than 20 hectares. Does it covers in the operation in case you comply the requirements? | *The area covered by CADT are the boundary of the IFMA. So, it's not.<br>*The harvesting now covers only the Esperanza and Senator Ninoy Aquino. |
| Land, People | Henilo Dungog, Brgy Captain , Datu Wasay, Kalamansig | *How many years does the company has no operations in Kalamansig and Senator Ninoy Aquino? Your IFMA now was inter-planted with coffee underneath. If you cut the trees under IFMA, will you compensate the people with their crops? | *There were several public hearing conducted, symposium being done because of that same problem. The company strongly stands, that the mandate of the IFMA contract is to plant trees inside the lease area issued by the DENR. It is very clear that the company will plant trees. If ever, there is christian or native who will interplant coffee trees underneath the plantation trees, we can just say, "buhay-buhay na lang". Because if we barred him from planting coffee, it will cause bad effect in the surrounding. Before, while the trees are growing, we know you were inter-planting coffee trees. But we closed our eyes. We know that. The problem arises during harvesting of trees. We, instead, has an obligation for compensation. Our reply to that, the company, we don't owe for any compensation because the company didn't give permission before, permission to plant coffee, didn't even ask for profit share of said coffee. That is why, just go with the flow. If we harvest, you do your |

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| | | | pruning in case your coffee trees get damage. When the company will plant trees, your coffee still there. |
| Land, People | Henilo Dungog, Brgy Captain , Datu Wasay, Kalamansig | *Based on what sir Baloria answered, that it is not clear that the Christian or IPs will be compensated by the concession of the company. When cutting of trees in the 29,000 hectares, what should be done? Will it be replaced? | As you said, all trees in the 29,000 will be cut. The original IFMA area is 29,000. It has 5 blocks. Block 1, block 2, block 3, block 4 and block 5. The schedule for harvesting, within the 10,442 hectares established plantation of the company is 2,318 hectares. That is plantation only not natural species. It is clearly stated a while ago, since you are in Kalamansig side, there is no operation in your area. So, it is not the entire 29,000 that will be cut otherwise, there will be no forest left in Sultan Kudarat. The only protected forest in Sultan Kudarat is under the IFMA area. |
| People | Liezah Seguano Brgy Captain, Limulan, Kalamansig | *You will cut trees only in the upper area. Not here in kalamansig since it is already done. From upper area going down here in Kalamansig, you will pass here, and there are existing houses along the road, and since you will be passing here, and it cannot be avoided because the trees are very long, there will be some houses that will be affected. They cannot immediately transfer as they do not have money. What can you help sir? | *We will conduct survey esp. those along the road, lower or going up, to determine the real problem and if there are houses that will be affected. |
| People | Liezah Seguano Brgy Captain, Limulan, Kalamansig | *Those houses that will be affected, they should have financial assistance so they could transfer. The newly paved roads here, for example, it will proceed, will it be damage once your truck passes through? | It cannot be, because of the thickness of your cement. Then, it is plantation trees and is very light. |
| Land, People | Liezah Seguano Brgy Captain, Limulan, Kalamansig | *Community benefits to be asked by the Barangay government | *To identify and discuss from the grass-root level the benefits that is most applicable to the community<br>*Harvesting operations is a by phase operation following the cut and plant system. Only identified matured trees will be cut within the IFMA area. |

A. Summary of Baseline Characterization

<table>
<tr><td>The Land</td><td>The province of Sultan Kudarat's terrain is diverse with extensive coast, plains and valleys, hills and mountains.<br><br>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.<br><br>The existing vegetation within the IFMA area are as follows:<br><br>
<table>
<tr><td>Vegetative Cover</td><td>Present Area (in hectares)</td></tr>
<tr><td>Production Residual Forest</td><td>2,116</td></tr>
<tr><td>Degraded Residual Forest</td><td>12,038</td></tr>
<tr><td>Established Tree Plantation</td><td>10,442</td></tr>
<tr><td>Agro-forestry/Cultivated Areas</td><td>1,043</td></tr>
<tr><td>Open land/brush land</td><td>2,713</td></tr>
<tr><td>Resettlement Area</td><td>733</td></tr>
<tr><td>Total</td><td>29,085</td></tr>
</table>
</td></tr>
<tr><td>The water</td><td>The Project Area straddles portions of the Kabulnan 2 watershed and the Salaman watershed<br><br>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..<br><br>There are three major river systems running through the IFMA areas: Tran, Kulaman, and Kabulnan. And these falls under Class A River.</td></tr>
<tr><td>The Air</td><td>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.<br><br>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.</td></tr>
<tr><td>The People</td><td>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.<br><br>Majority of the inhabitant source of livelihood income comes from farming. The dialects spoken are mixed such as Ilonggo, Visaya, Teduray, Manobo and Muslim.</td></tr>
</table>

B. Summary of Impact Assessment & Environmental Management Plan

| Proj. Phase/<br><br>Envtl Aspect | Envtl Component likely to be<br><br>Affected | Potential Impact | Options for prevention / mitigation | Cost | Guarante Fee |
|---|---|---|---|---|---|
| Pre-Operations | | | | | |
| *Permitting/Clearances applications<br><br>*Survey & Mapping<br><br>*Existing Road/Spur Road Rehab & maintenance<br><br>*Repair and maintenance of existing support facilities | Land | *Non awareness of proposed projects<br><br>* Disturbance to wildlife and damages to existing vegetation from cutting, clearing or removal of weeds, grasses and other types of vegetation during site preparation<br><br>*crossing of heavy equipment and trucks may cause siltation to rivers and creeks resulting to decrease in production of phytoplanktons, zooplanktons, benthos in rivers and creeks.<br><br>*Dilapidation of maintained bridges and existing unpaved Roads Bridges/ spillways<br><br>•11 units of bridges<br>•3 units of spillways<br>-Logging roads<br>•161 kms<br>-Main roads<br>•143 kms<br>-Spur roads<br>•18 kms<br><br>*Dilapidation of existing support facilities and buildings in Camp site<br><br>-Office building<br>-Motorpool<br>-central nursery<br>-commissary<br>-warehouse<br>-patrol tower<br>-communication facilities<br>-generator sets<br>-Guesthouse<br>-Staff house<br>-Bunkhouse<br>-Others | *Conduct IEC and public participation<br><br>*Apply and secure permits / clearances to concern agencies prior commencement of project<br><br>*Controlled and minimized clearing and cutting of vegetation to allow sufficient passage way to project site<br><br>*Conduct stand inventory, research and planning<br><br>*Concentrate heavy equipment on few tracks as possible<br><br>*Controlled surface runoffs from the project site to ensure water catchments and intake points of local populations are not affected<br><br>*Installation of culverts and spillways to avoid siltation in rivers and/or creeks<br><br>*Ensure an all-weathered road conditions for safe passage and traffic free management<br><br>*Equipment must at all times in good conditions with regular check-up and preventive maintenance all year round<br><br>*Avoid use of road during heavy rainfall and implement bouldering activities on affected areas<br><br>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<br><br>*Installation of Material Recovery facility for proper segregation of solid wastes generated | 1 million | EGF/EMF |
| | Air & noise quality | *Dust generation and noxious emission<br><br>*Noise pollution | *Cover backload of hauler trucks with canvass<br><br>*Regular sprinkling of water of unpaved roads or exposed soils /grounds esp. during summer / dry periods | | |

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| | | | *Removed muds and dirt on trucks wheel.<br><br>*Hauler Trucks must slowed down in passing populated areas to minimize dust generation.<br><br>*Wearing of mask or googles during hauling and cutting activities<br><br>*All heavy equipment / noisy construction activities shall be done during day time.<br><br>*Implement proper maintenance of equipment and use of muffler for certain equipment. | | |
| | People | *Traffic / Transportation safety | *Controlled / scheduled movement to avoid road accidents / traffic occurrence | | |
| Operations | | | | | |
| *Cutting and skidding<br><br>*Nursery Management<br><br>*Plantation development<br><br>*Hauling and Transport | Land | *Solid waste generation<br><br>*Erosion<br><br>*soil compaction | **Minimized the use of chemicals or pesticides for a period of three months only.*<br>**Organic or bio-organic shall be preferred alternative to correct the nutrients deficiencies,*<br>**conduct round weeding and row brushing of newly transplanted seedlings / saplings every quarter as plantation maintenance for a period of three years*<br>**Maintenance of a stable ecosystem through the preservation of the diverse flora and fauna and the protection, management and development of the natural forest area.*<br>**50% slope and above 1000 elevation will be allocated as protection forest*<br>**Manage the PRF and DRF areas through Assisted Natural Regeneration, Enrichment Planting and supplemental planting or Timber Stand Improvement.*<br>**Selective logging system will be implemented for PRF areas once E.O 23 will be lifted and moratorium on logging suspension.*<br>**Application of appropriate silvicultural practices and introduction of appropriate technologies, if deemed necessary*<br>**Use planting distance of 2x3 meters with pre- thinning at the end of 4th year and 8th year to achieve healthy and quality tree growth.*<br>**Right after final harvest, site preparation, replanting and/or coppice tending shall be done.*<br>**Removal of all equipment and temporary structures after final harvest and skidding to avoid disturbance to flora and fauna.* | 5 million | EGF/EMF |

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| | | | **Immediate revegetation of log-over areas using planting materials of mixed fast growing forest trees species within six months to recover soil nutrients and strengthen its water holding capacity.*<br>** 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.*<br>**Implement regular waste collection and disposal system at site.*<br>**Install collection points located strategically if the IFMA area for proper solid waste segregation*<br>**Implement re-use, reduce and recycle*<br>**Identify temporary waste disposal within the project area for disposal of waste generated.*<br>**Allow the community to collect twigs and branches for use as fuelwood to reduce logging residues.*<br>**log waste shall be left in the area to decay and serve as compost restoring soil nutrients in the log over areas while non-biodegradable shall be brought to material recovery facility for proper disposal hereof.*<br>**Ensure an all-weathered road condition and bridges for proper traffic management*<br>**Removed muds and dirt on trucks wheels.*<br>**Hauler Trucks must slow down in passing populated areas to minimize dust generation.*<br>**Wearing of mask or googles during hauling and cutting activities*<br>**Used Oil will be collected and stored in safe container to avoid spill over.*<br>**concentrate heavy equipment on few tracks as possible*<br>** Implement regular waste collection and disposal system at site.*<br>**Installation of appropriate physical barrier (terracing, contour trenching, bund construction) to give the chance the roots to anchor*<br>**Access roads, if not controlled, may expose threat for in-migration, conversion to agri, live stock, hunting, mining, illegal fuelwood extraction and/or charcoal production and colonization by invasive plant species*<br><br>**installation of Material Recovery Facility for proper segregation of solid wastes generated* | | |
| | Air & Noise | *Dust generation | *frequent watering of unpaved roads during dry period<br><br>*use heavy equipment during day time only<br><br>*Regulated speed of vehicles especially in populated areas. | | |

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| | | *Noise pollution | *Cover backload of hauler trucks with canvass<br><br>*regular watering of unpaved roads or exposed soils/grounds<br><br>*Regular checkups and preventive maintenance of Heavy equipment and all types of vehicles to avoid increase of total suspended particulate<br><br>*Implement proper maintenance of equipment and use of muffler for certain equipment.<br><br>*All hauling and cutting equipment must be used only during daytime to avoid noise disturbance.<br><br>*Use muffler and existing road access / trail to plantation site and production site to avoid disturbance to flora and fauna<br><br>*No burning of refuse lubricants and used oil.<br><br>*All hauling and cutting equipment must be used only during daytime to avoid noise disturbance.<br><br>* *Plantation establishment of mixed forest trees species will generate biomass that will help in carbon sequestration | | |
| | Water | Water quality degradation<br><br>Siltation | *Prohibit direct disposal of waste to water bodies<br><br>*continue water conservation measures, maintenance and rehabilitation<br><br>(protection of buffer zones -40 meters on both sides of rivers and streams)<br><br>*Prohibit direct disposal of waste to water bodies<br><br>*install sediments traps at the end of drainage channels<br><br>*organic fertilizer should be used/applied as possible<br><br>*construction of adequate drainage shall be considered to ensure continuous protection of water resources | | |
| | People | Income generation to impact areas<br><br>Forest Fire | *priority hiring on local inhabitants esp. the IP's<br><br>*Formulate / implement programs on forest fire prevention and protection<br><br>*Continue implement the community | | |

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| | | | development programs esp. to IP's<br><br>*Regular and on-time payments of forest charges, permits and others<br><br>*conduct foot patrol/aerial patrol quarterly or as deemed necessary to detect and deter any illegal activities occur within IFMA area.<br><br>*Ensure road access is well maintained at all times esp during rainy season to avoid road traffic / congestion<br><br>* Provide traffic signs and proper scheduling of vehicle movement such as transport materials during off-peak hours.<br><br>*Implement traffic management for immediate response and action during fire, accident, explosion and risk / threat occurrences within IFMA premises.<br><br>*Controlled movement of incoming and outgoing vehicles.<br><br>*Regular checkup / preventive maintenance of all type of vehicles to avoid mechanical failure, thus affecting the road flow<br><br>*All warning device must be functional at all times to avoid road collision esp at night time. | | |
| Post Operations | | | | | |
| •Information for abandonment to DENR and concerned LGU<br><br>•Removal of facility / equipment at site<br><br>•Revegetation of log areas | Land | *Solid waste generation<br><br>*Log over areas | *Proper segregation and disposal of waste*<br>*In the event of non-reproposedal, inform DENR / concern offices prior expiry of IFMA agreement / area abandonment*<br>*All standing facilities shall be turnover to LGU or to Cooperatives*<br>*An agreement shall be made and agreed with certain terms and conditions regarding the compensation of the existing developments*<br>*Ensure that no structure shall be left behind that will affect human safety and water quality.*<br>*All materials shall be removed, and any land that is contaminated with oily/grease and other possible contaminant shall be cleaned/remedied*<br>*Materials that can be recycled, shall be re-use and recycled or sold to junkshops.*<br>*Unusable waste shall be properly disposed of to the municipal waste facility.*<br>*Equipment shall be sold or transferred to other project site*<br>*Large exposed areas shall be planted | 250,000 | EGF/EMF |

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| | | | *with fast mixed growing species*<br>**Cleaned up schedule will be coordinated with the municipal concern for proper disposal and monitoring hereof.* | | |
| | Air & Noise | *Dust generation<br><br>*Noise pollution | **hauling trucks must have canvass or any materials of same kind to cover backloads*<br><br>**Regular watering of unpaved roads until the area will be fully abandoned and turned over to DENR or Cooperatives via LGU*<br><br>**Remove muds/dirt from trucks*<br><br>**Regular checkup, preventive maintenance and repair of all types of equipment and vehicles*<br><br>**use heavy equipment during day time only or ensure to use muffler if needed* | | |
| | Water | Minimal Impact | **Few people will leave the site, remains only those local inhabitants who resettled in the area, thereby waste will be minimized with no adverse impacts in the environment* | | |
| | People | Displacement of People | **Few of qualified employee shall be transferred for work to other project site*<br><br>**Retrenchment of employees following DOLE guidelines with appropriate processing hereof*<br><br>**Most, if not all, will leave the area but some local people residing the resettlement area shall remain and get back to farming (farm implements and planting materials provided by M&S)* | | |

C. Summary of Environmental Monitoring Plan

| Envt'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 | | | | |
| | | | | | | | | | | | | | |
| Pre-Operations | | | | | | | | | | | | | |
| • Land | Solid waste | Total solid waste generated | On-site /ocular inspection<br>Key | weekly | Production site<br><br>Camp site | LGU/<br><br>M&S | In-house monitoring | 5,000 | | | | | |
| • Water Quality | Siltation | DO, Nitrates, Oil and Grease, Phosphates as Phosphorus, BOD, Organo-phosphates, Total Coliform, TSS | Water sampling for lab analysis | Semi-Annual | Upper Tran river<br>124◦17'43.64"E<br>6◦34'22.40"N<br>Mid Stream Tran River<br>Lower Tran River<br>124◦17'20.120"E<br>6◦35'9.340"N<br>Upper Kulaman River<br>124◦22'4.580E<br>6◦33'19.050"N<br>Midstream Kulaman River<br>Lower Kulaman River<br>124◦21'18.820"E<br>6◦41'18.860"N<br>Upper Cabulanan River<br>124◦22'47.500"E<br>6◦40'1.390"N<br>Midstream cabulanan River<br>Lower Cabulanan River<br>124◦22'7.950"E<br>6"40'40.600"N | M&S | In-house monitoring /<br><br>3rd Party EMB Accredited | 80,000 | | | | | |

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| • Air Quality | Dust generation<br><br>Noise Generation | PM10<br>TSP<br><br>Daytime Session<br>55 dBA<br><br>Evening session<br>50 dBA | High volume – gravimetric method for TSP and PM10<br><br>50 readings (Wilson 1989); direct reading sound level meter (A-weighted dBa scale) | Semi-annual<br><br>1hour monitoring<br><br>24 hr monitoring | Production area<br><br>Camp Site | | M&S / 3rd Party EMB Accredited | 90,000 | | | | | |
| • People | In-flux of people | Increase in population | HH survey | yearly | Within IFMA area | M&S | In-house monitoring thru coordination w/ LGU | 50,000 | | | | | |
| Operations | | | | | | | | | | | | | |
| • Land | Solid Waste | Total solid waste generated | On-site / ocular inspection | weekly | Inside IFMA area | M&S | In-house monitoring | 10,000 | | | | | |
| • Water Quality | Siltation | DO, Nitrates, Oil and Grease, Phosphates as Phosphorus, BOD, Organo-phosphates, Total Coliform, TSS | Water sampling for lab analysis | Annual | Upper Tran river<br>124◦17’43.64”E<br>6◦34’22.40”N<br>Mid Stream Tran River<br>Lower Tran River<br>124◦17’20.120”E<br>6◦35’9.340”N<br>Upper Kulaman River<br>124◦22’4.580E | M&S | In-house monitoring | 80,000 | | | | | |

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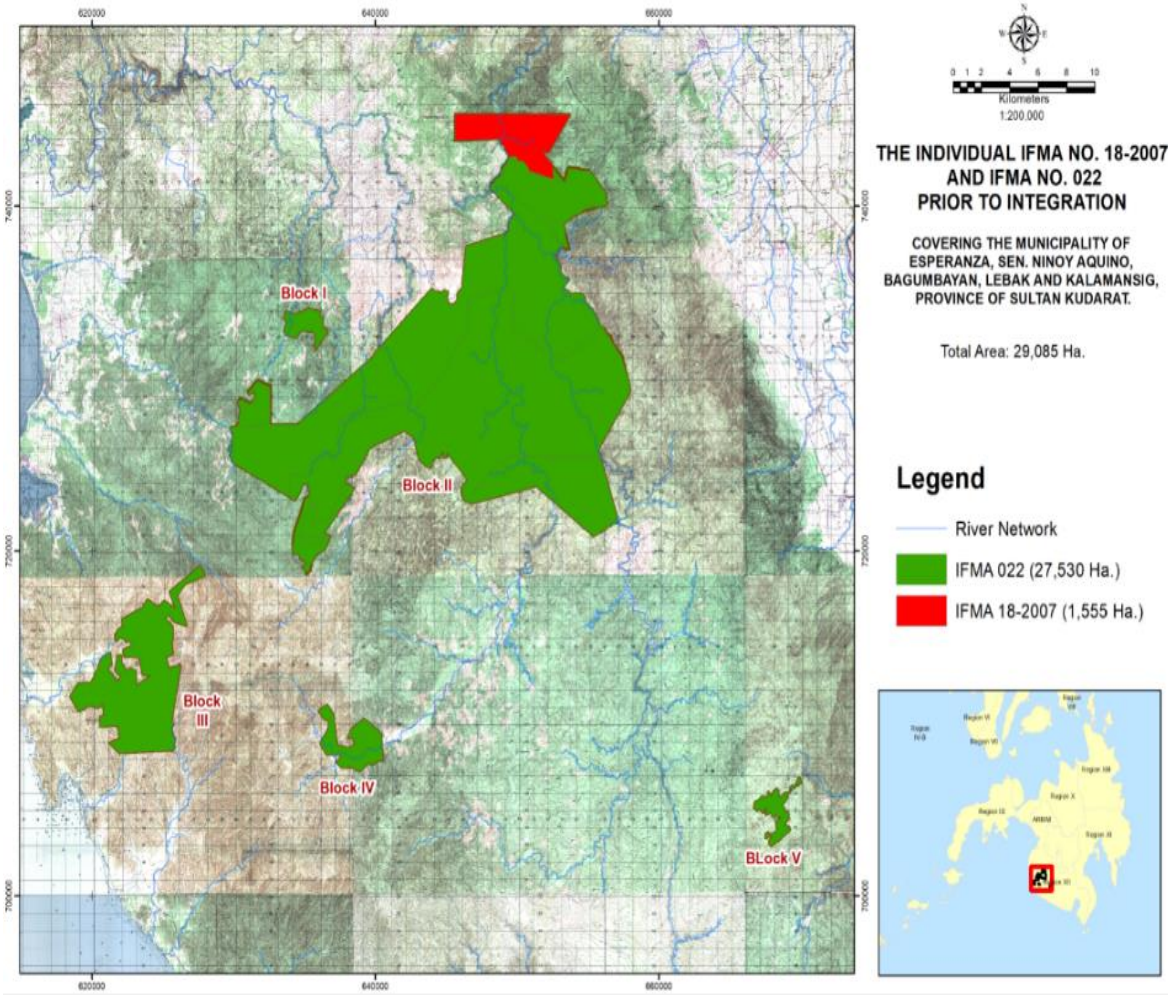
| | | | | | 6◦33'19.050"N<br>Midstream Kulaman River<br>Lower Kulaman River<br>124◦21'18.820"E<br>6◦41'18.860"N<br>Upper Cabulanan River<br>124◦22'47.500"E<br>6◦40'1.390"N<br>Midstream River<br>Lower Cabulanan River<br>124◦22'7.950"E<br>6"40'40.600"N | | | | | | | | |
| • Air Quality | Dust generation<br><br>Noise Generation | PM10<br>TSP<br><br>Daytime Session<br>55 dBA<br><br>Evening session<br>50 dBA | On-site / ocular inspection<br><br>1 hour monitoring<br><br>24 hr monitoring | Semi-annual | Production area<br><br>Camp Site | M&S | In-house monitoring | 90,000 | | | | | |
| • People | Influx of people<br><br>Health Profile | HH survey<br><br>Top 5 causes of morbidity / mortality | Key informants interview / Health Clinic | Semi-Annual | *Inside IFMA area | M&S | In-house monitoring thru coordination with LGU | 50,000 | | | | | |
| Post Operations/abandonment | | | | | | | | | | | | | |
| • Land | Solid Waste | Total solid waste generated | On-site / ocular inspection | weekly | Inside IFMA area | M&S | In-house monitoring | 10,000 | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • Water Quality | Siltation | DO, Nitrates, Oil and Grease, Phosphates as Phosphorus, BOD, Organo-phosphates, Total Coliform, TSS | Water sampling for lab analysis | Annual | Upper Tran river<br>124◦17'43.64"E<br>6◦34'22.40"N<br>Mid Stream Tran River<br>Lower Tran River<br>124◦17'20.120"E<br>6◦35'9.340"N<br>Upper Kulaman River<br>124◦22'4.580E<br>6◦33'19.050"N<br>Midstream Kulaman River<br>Lower Kulaman River<br>124◦21'18.820"E<br>6◦41'18.860"N<br>Upper Cabulanan River<br>124◦22'47.500"E<br>6◦40'1.390"N<br>Midstream River<br>Lower Cabulanan River<br>124◦22'7.950"E<br>6"40'40.600"N | M&S | In-house monitoring | 80,000 | | | | | |

# 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 repute 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 2,318 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*
***Error! No text of specified style in document.****-1. Location of Region X!I 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 **Error! No text of specified style in document.**-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 06º 23' 09" to 06º 43' 08" N latitude and 124º 25' 00" to 124º 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 **Error! No text of specified style in document.**-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 |
| BlockV | Bagumbayan | 310 |
| **Total** | | **29,085** |

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

*Table **Error! No text of specified style in document.**-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 |
| 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 |
| **Block III** | | |
| **Point** | **Longitude** | **Latitude** |
| 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 |
| 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° 89 23" E | 6° 29' 40" N |
| 50 | 124° 89 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 |
| **Block IV** | | |
| **Point** | **Longitude** | **Latitude** |
| 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 |

| **Block V** | | |
|---|---|---|
| **Point** | **Longitude** | **Latitude** |
| 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*

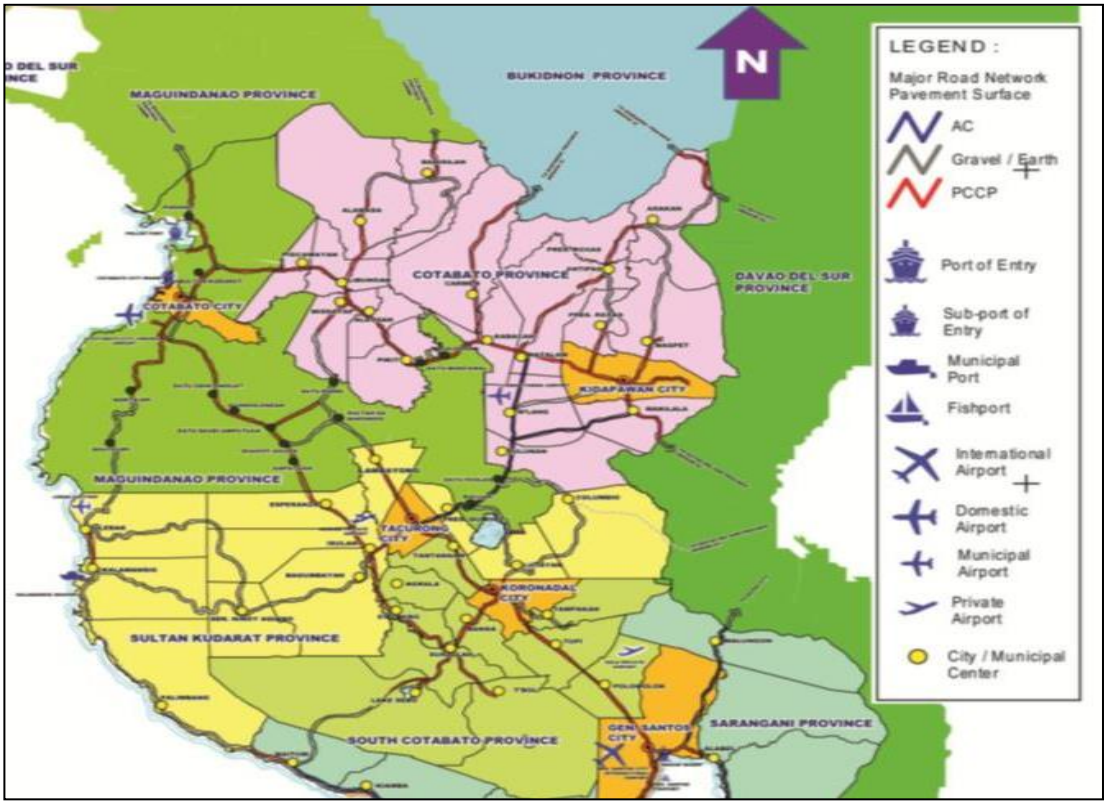
The IFMA project area is approximately 60 km northwest of Koronadal City, South Cotabato Province, the administrative center of Region XII and 115 km northwest of the highly-urbanized General Santos City, the regional center for trade and commerce. About 58 km northwest is the independent city, Cotabato 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.

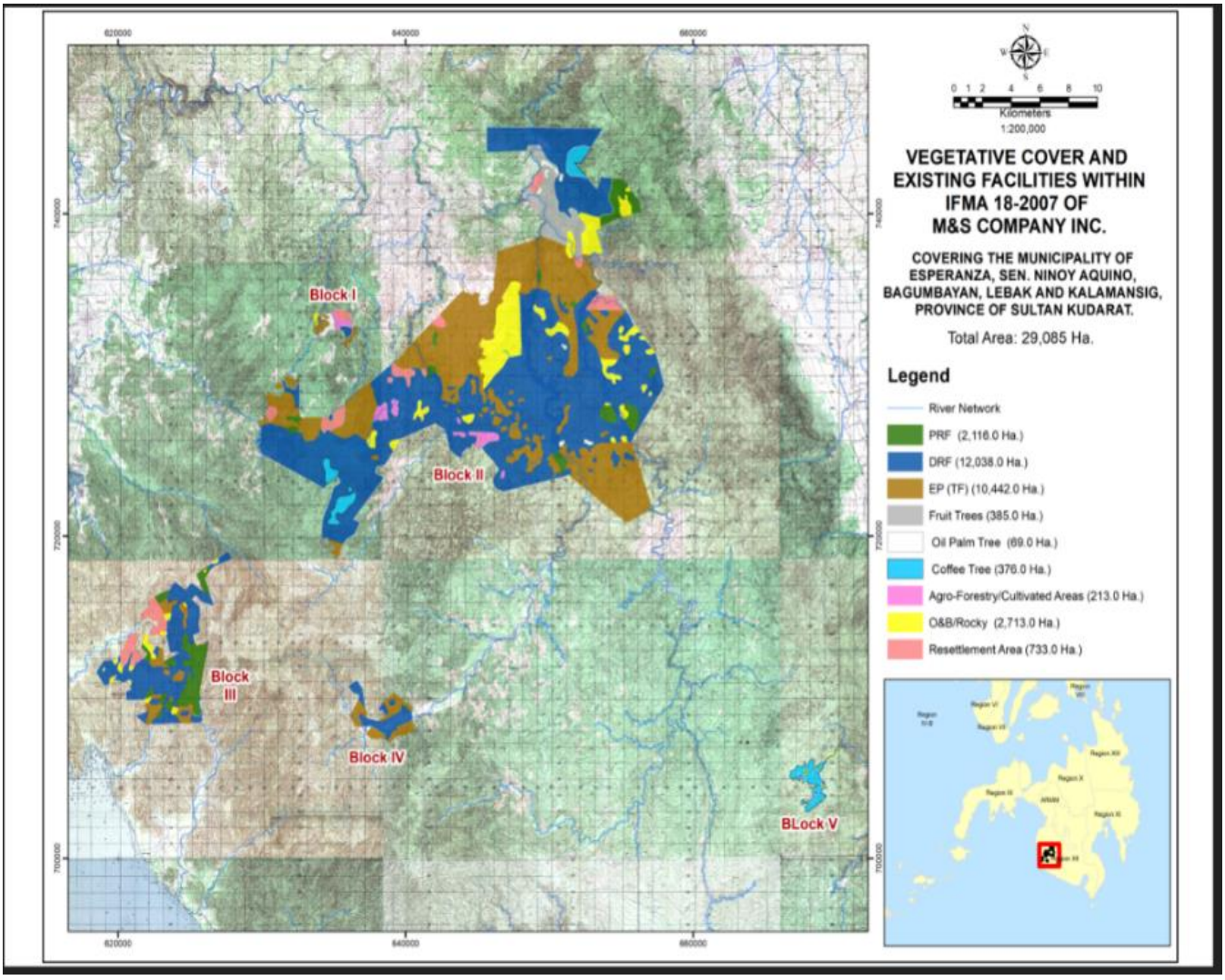
There are also two existing seaports in the province that are near the concrete-paved Awang-Upi-Lebak-Kalamansig-Palimbang-Sarangani Road which connects to the SNA-Kalamansig-Lebak Road and could facilitate travel to the Consolidated IFMA Project Area. The seaports are the Port of Lebak in Poblacion,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

*Map **Error! No text of specified style in document.**-3. Transportation Map, Province of Sultan Kudarat and Adjacent Areas*



### *1.1.2. Impact Areas*

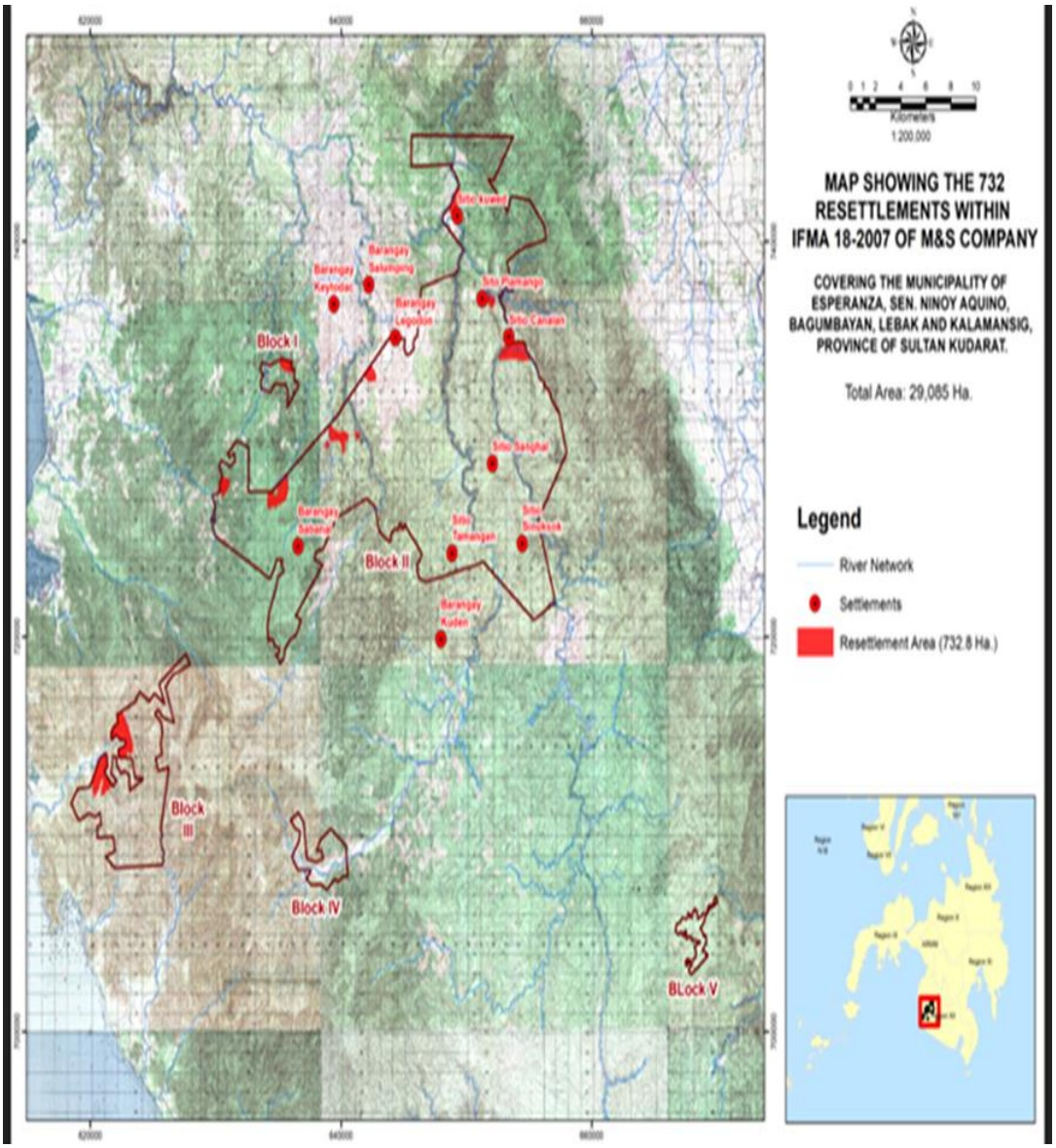
In the planting, harvesting, and maintenance operations and other related activities, the project area to be affected is the 29,085 -hectare of IFMA project site with below map showing the PRF, DRF, EP, O/B, Cultivated and Resettlement areas. (Map 1-4)




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 $NO_x$ and $SO_x$ at the IFMA area and hauling routes, and noise generation. (**Map 1-4**).

*Map1-5. 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.

Please refer to Additional Maps as Annex S showing the direct impact areas within the IFMA area, hauling route and harvesting operations of M&S Company Inc program for Four (4) years for planted species identified as matured and due for harvesting.

## 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. Developmenty/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 Procesing 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

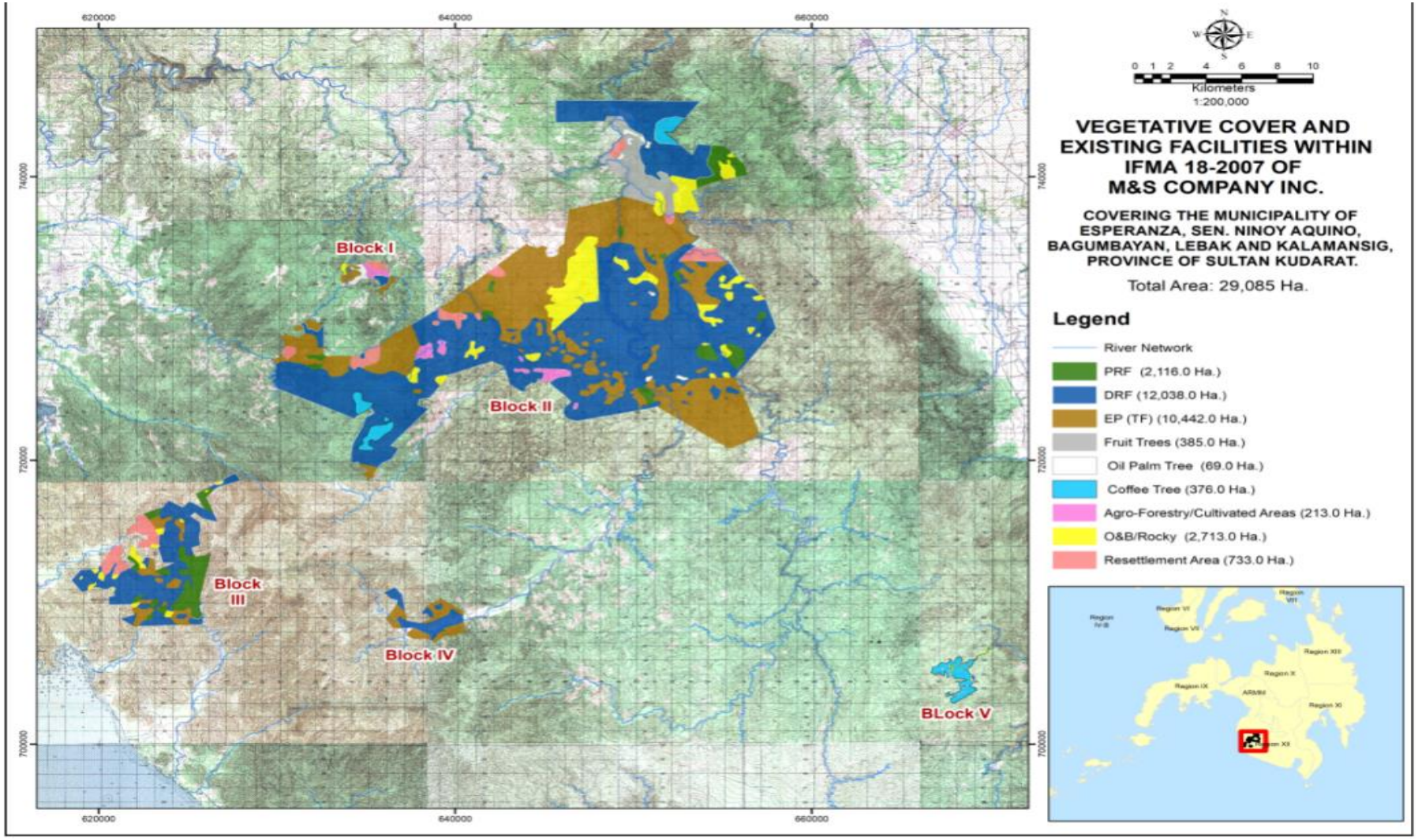
b. Plantation Development

## *1.4.1. Area Allocation and Description*

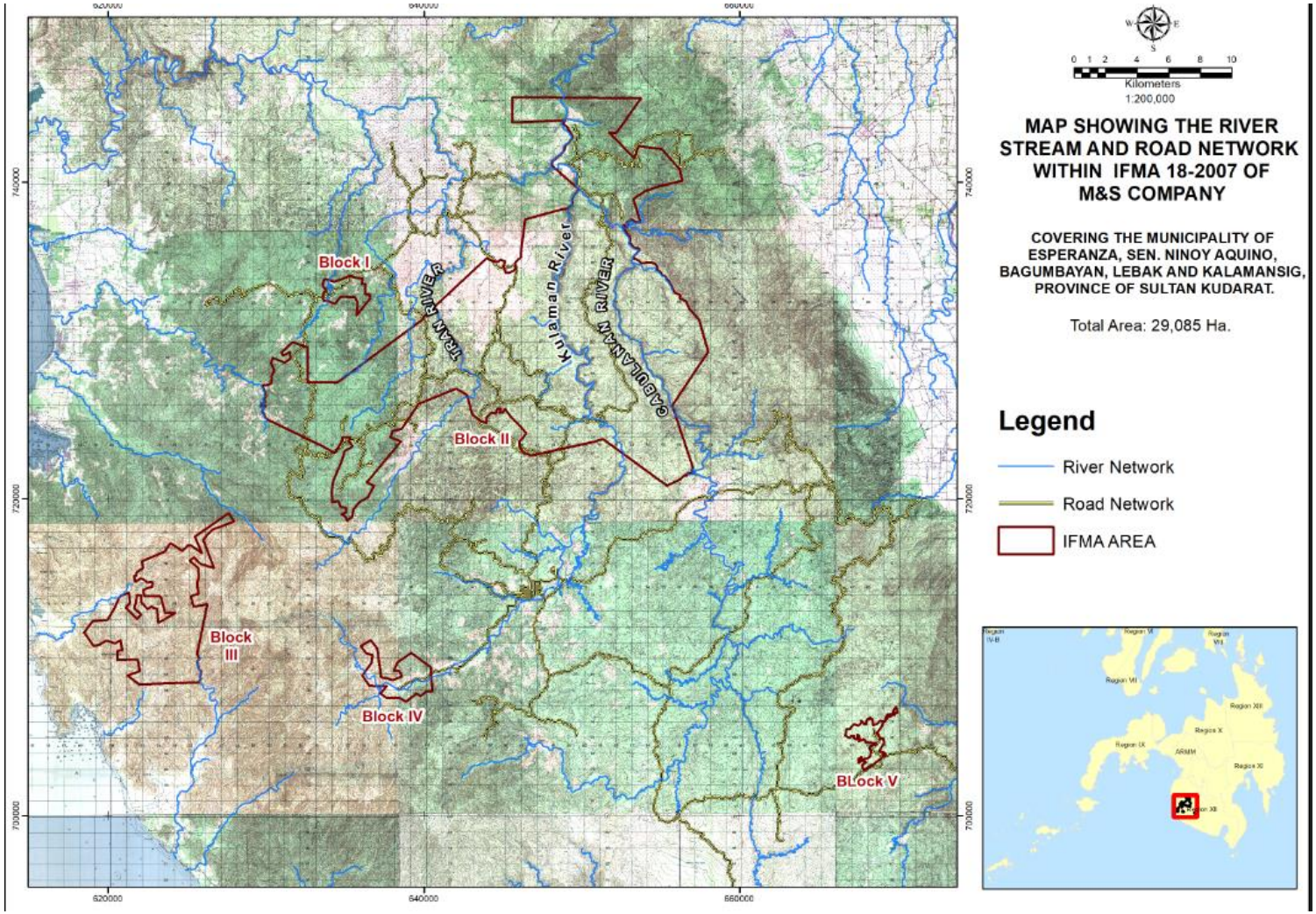
The IFMA No. 18-2007 of MSCI comprises an aggregate area of 29,085.0 hectares. It is composed of Production Residual Forest, Degraded Residual Forest, Established Plantations, Open /Brush lands, Cultivated /Agroforestry Areas and Resettlement Area.

| 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** | **29,085.00** |

Map 1 6. Location of Major Components of Proposed IFMA



Map 1-7, showing the existing road network within the IFMA 18-2007 of M&S Company Inc.



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 1-7** 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

### *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, souring 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 eight 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 eco-system 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 wich 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 managementplan. 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 **Error! No text of specified style in document.**-3. Management Scheme per Type of Area*

| Vegetative Cover | | Management scheme | Area (Has). |
|---|---|---|---|
| Production Residual forest | 2,116 | - Manage as production natural forest where selective timber harvesting will be implemented once E.O 23 will be lifted.<br>- Protection forest/buffer zone | 264<br>423 |
| Degraded Residual Forest | 12,038 | - Develop and manage into industrial plantation of mixed species consistent with Sec. 2.2 of E.O 23<br>- Areas to be maintained as protection forest/ buffer zones | 9,823<br>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 activitirs | 733 |
| **Total** | **29,085** | | **29,085** |

## *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 **Error! No text of specified style in document.**-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 **Error! No text of specified style in document.**-3. Schedule and Area to be Planted in Open/Brushland Areas*

| | Forest Tree | | | Agro-forestry | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Yemane | Mangium | Sub-total | Rubber | Coffee/ Oil Palm | Sub-total | 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 |
| **Totall** | **750** | **1,000** | **1,750** | **442** | **521** | **963** | **2,713** | **100** |

*Table 1.4. 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 |
| **Total** | **980** | **3,500.0** | **3,500.0** | **500.0** | **8,480.0** | **1,342.6** | **9,822.6** | **100** |

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$^{th}$ 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 a e 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 LGUSs 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, laborers and consultants will be contracted in the area for survey Mapping, roadside rehabilitation and hauling activities (materials, equipment and manpower).

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 esp. the Indigenous Cultural Communities. About 80-90% of the total personnel requirements will be for local residents. Employment applications will be coursed through the barangay captains of nearby communities of IFMA Project Area. In the case of Indigenous Peoples (IP's), the employment applications will course through to their Tribal Head / Timuay for proper coordination and screening. They possibly landed as laborers, nursery workers, plantation workers, fruit harvesters, deputized forest guard or depending on their individual qualifications/experiences. Qualified IP's applicants shall be endorsed by their Tribal Head / Timuay to our Human Resources Department for appropriate action. Employment age for labor force starts at the age of 18 to 60 yrs old, both for male and female. Age 60 to 65 up is under the discretion of the company and becomes mandatory retirement at the age of 65 and up.

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 1-6 to 1-7** below:

*Table 1**Error! No text of specified style in document.**-4. Manpower Requirement – Operations Phase*

| **IFMA Operations** | | | | | | |
|---|---|---|---|---|---|---|
| | **Total** | **M** | **F** | **Regular** | **Contractual** | **Seasonal** |
| ***Administrative/Staff*** | | | | | | |
| 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 | | |
| Pollution Control Officer | 1 | | 1 | 1 | | |
| Utility / Service Driver | 10 | 8 | 2 | 8 | | |
| Sub-total | 210 | 198 | 12 | 210 | - | - |
| ***Production*** | | | | | | |
| 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 | - |
| ***Road Maintenance*** | | | | | | |
| Foreman | 1 | 1 | | 1 | | |
| Backhoe Operator | 1 | 1 | | 1 | | |
| Road Grader Operator | 1 | 1 | | 1 | | |
| Bulldozer Operator | 1 | 1 | | 1 | | |
| Payloader Operator | 1 | 1 | | 1 | | |
| Dumptruck Driver | 5 | 5 | | 5 | | |
| Boulders | 5 | 5 | | | | 5 |
| Sub-total | 15 | 15 | - | 10 | - | 5 |
| ***Hauling*** | | | | | | |
| Supervisor | 1 | 1 | | 1 | | |
| Truck Master | 1 | 1 | | 1 | | |
| Hauler Driver | 10 | 10 | | | 10 | |
| Sub-total | 12 | 12 | - | 2 | 10 | - |
| | **Total** | **M** | **F** | **Regular** | **Contractual** | **Seasonal** |
| ***Reforestation*** | | | | | | |
| 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 |
| ***TOTAL*** | ***506*** | ***482*** | ***24*** | ***257*** | ***224*** | ***25*** |

*Table 1**Error! No text of specified style in document.**-5. Manpower Requirement – Abandonment/Decommissioning Phase*

| | Total | M | F | Regular | Contractual | Seasonal |
|---|---|---|---|---|---|---|
| ***Administrative/Staff*** | | | | | | |
| 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 / Utility | 5 | 4 | 1 | 5 | | |
| Pollution Control Officer | 1 | | 1 | 1 | | |
| Sub-total | 168 | 164 | 4 | 168 | - | - |
| ***Road Maintenance*** | | | | | | |
| Foreman | 1 | 1 | | 1 | | |
| Backhoe Operator | 1 | 1 | | 1 | | |
| Road Grader Operator | 1 | 1 | | 1 | | |
| Bulldozer Operator | 1 | 1 | | 1 | | |
| Payloader Operator | 1 | 1 | | 1 | | |
| Dumptruck Driver | 2 | 2 | | 2 | | |
| Boulders | 2 | 2 | | | 2 | |
| Sub-total | 9 | 9 | - | 7 | 2 | - |
| | **Total** | **M** | **F** | **Regular** | **Contractual** | **Seasonal** |
| ***Reforestation*** | | | | | | |
| 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 | - |
| ***TOTAL*** | ***193*** | ***188*** | ***5*** | ***179*** | ***14*** | ***-*** |

## 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

# 2. ASSESSMENT OF ENVIRONMENTAL IMPACTS

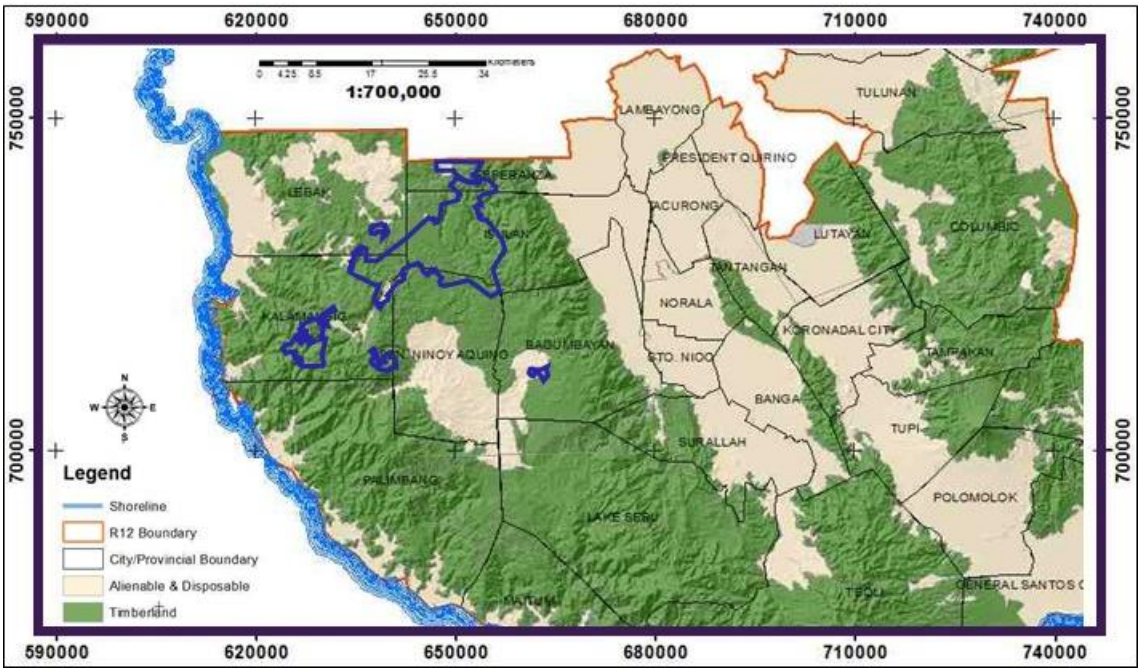
## 2.1 The Land

### *2.1.1 Baseline Environmental Conditions*

2.1.1.1 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 **Error! No text of specified style in document.**-4. Land Classification*




*Source: DENR Region XII 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 1-6. 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 |
| **Total** | **513,530** | **100.0** |

*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.

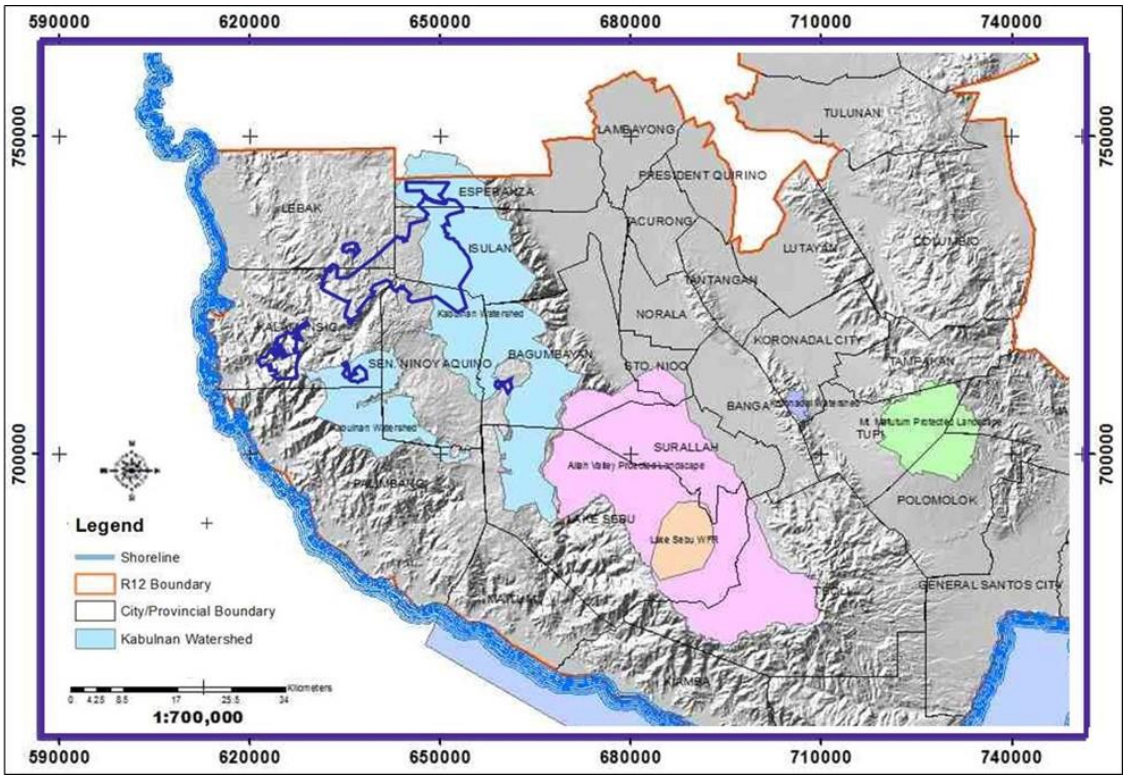
Some parts of the IFMA are in the protected forest area while the rest are in the production forests.

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

*2.1.1.1.1 Environmentally Critical Area*

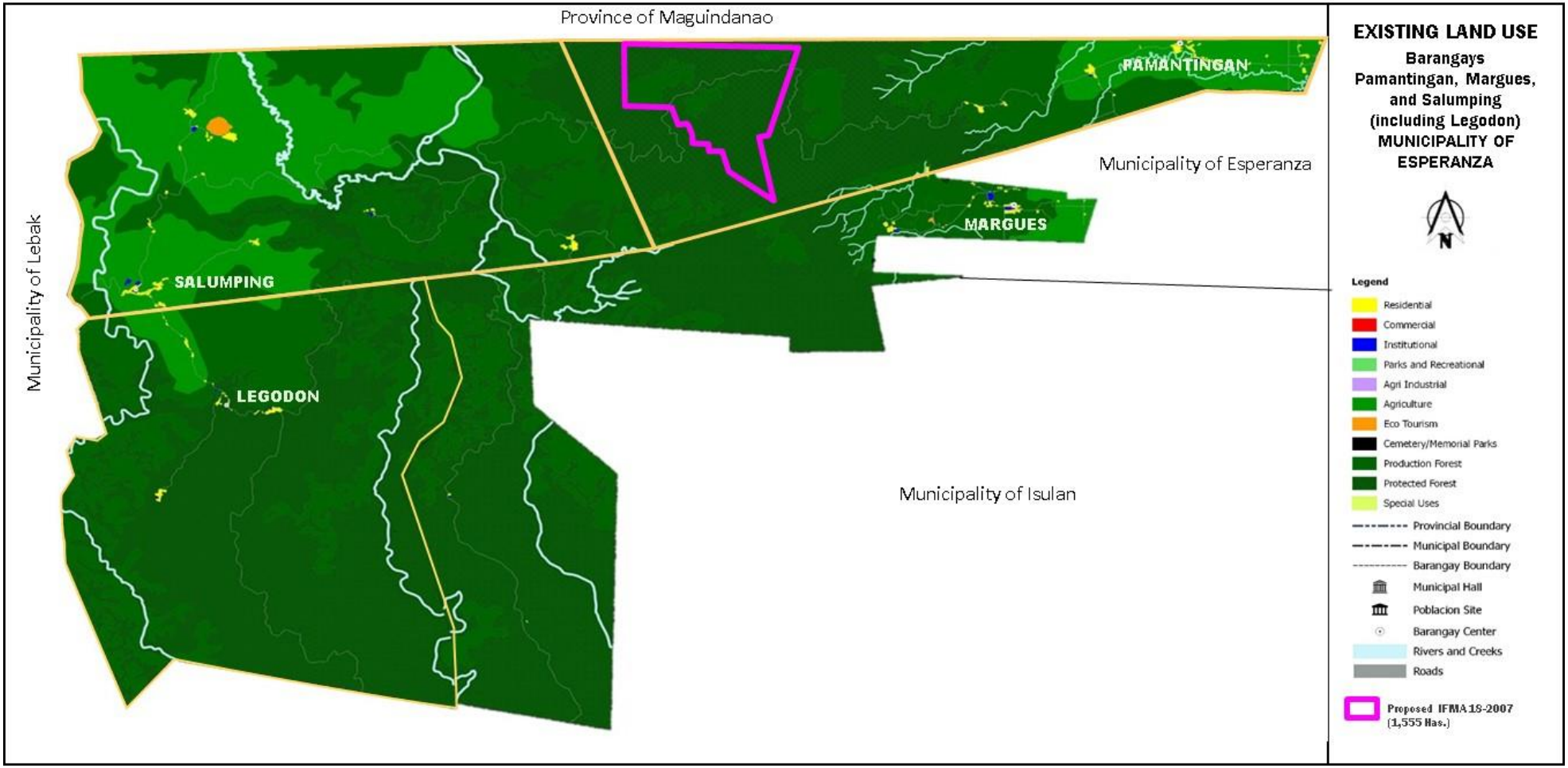
Proclamation No. 241 (February 8, 2000) established the Kabulnan River Watershed Forest Reserve (KRWFR) for the purpose of protecting, maintaining or improving the water yield and providing restraining mechanism for inappropriate forest exploitation and disruptive land-use in the area. As proclaimed, 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 1-5. Protected Areas*




*Source: DENR Region 12 www.r12.denr.gov.ph*

*Map 1-6. Existing Land Uses in Direct and Indirect Impact Barangays of the Proposed IFMA Project*

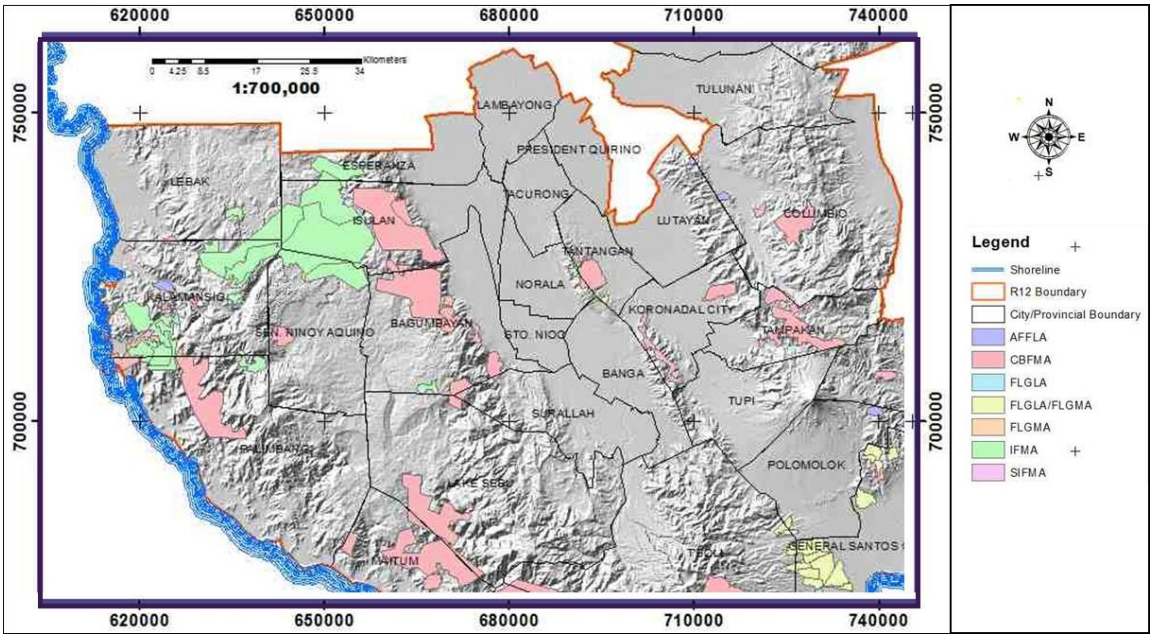



*Source: Municipal LGU of Esperanza, MPDO*

*2.1.1.1.2 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 1-7. Areas with Tenurial Instruments*




*Source: DENR Region 12, www.r12.denr.gov.ph*

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

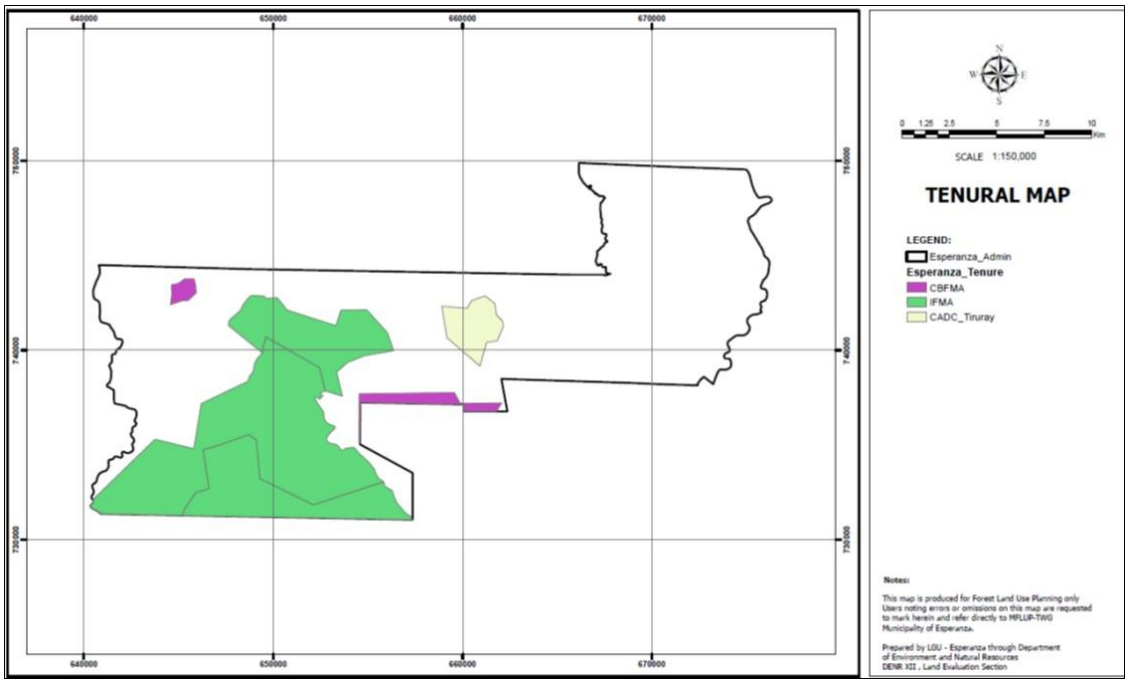
*Table 1-7. List of CADT Areas Near Project Site*

| 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). 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 1-8. Esperanza Municipal Map showing CADC Area*

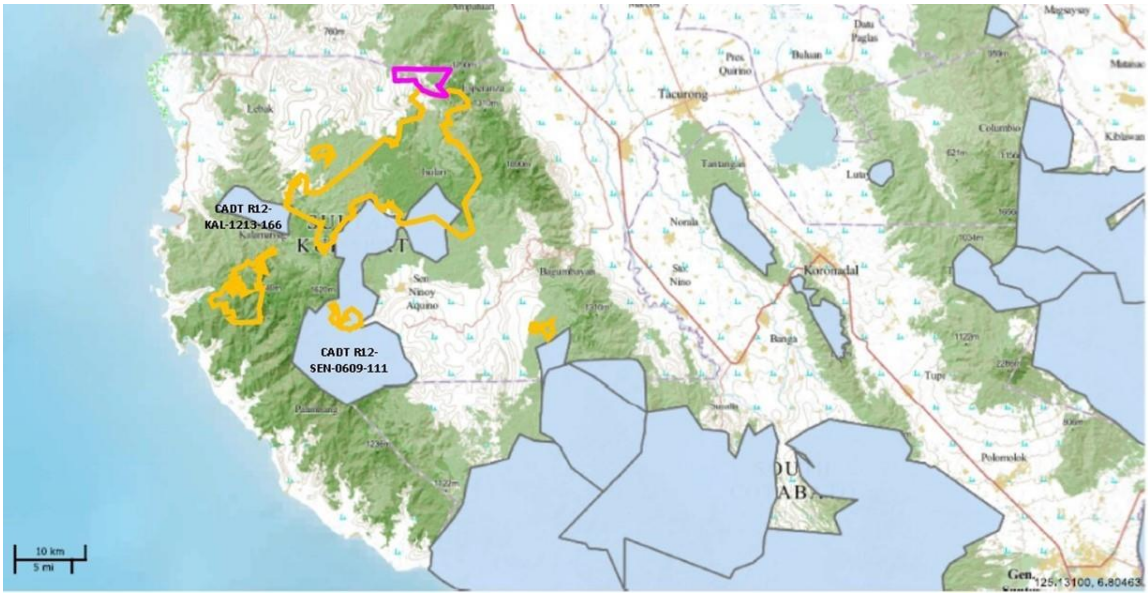



*Source: Esperanza Municipal Planning and Development Office*

**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.

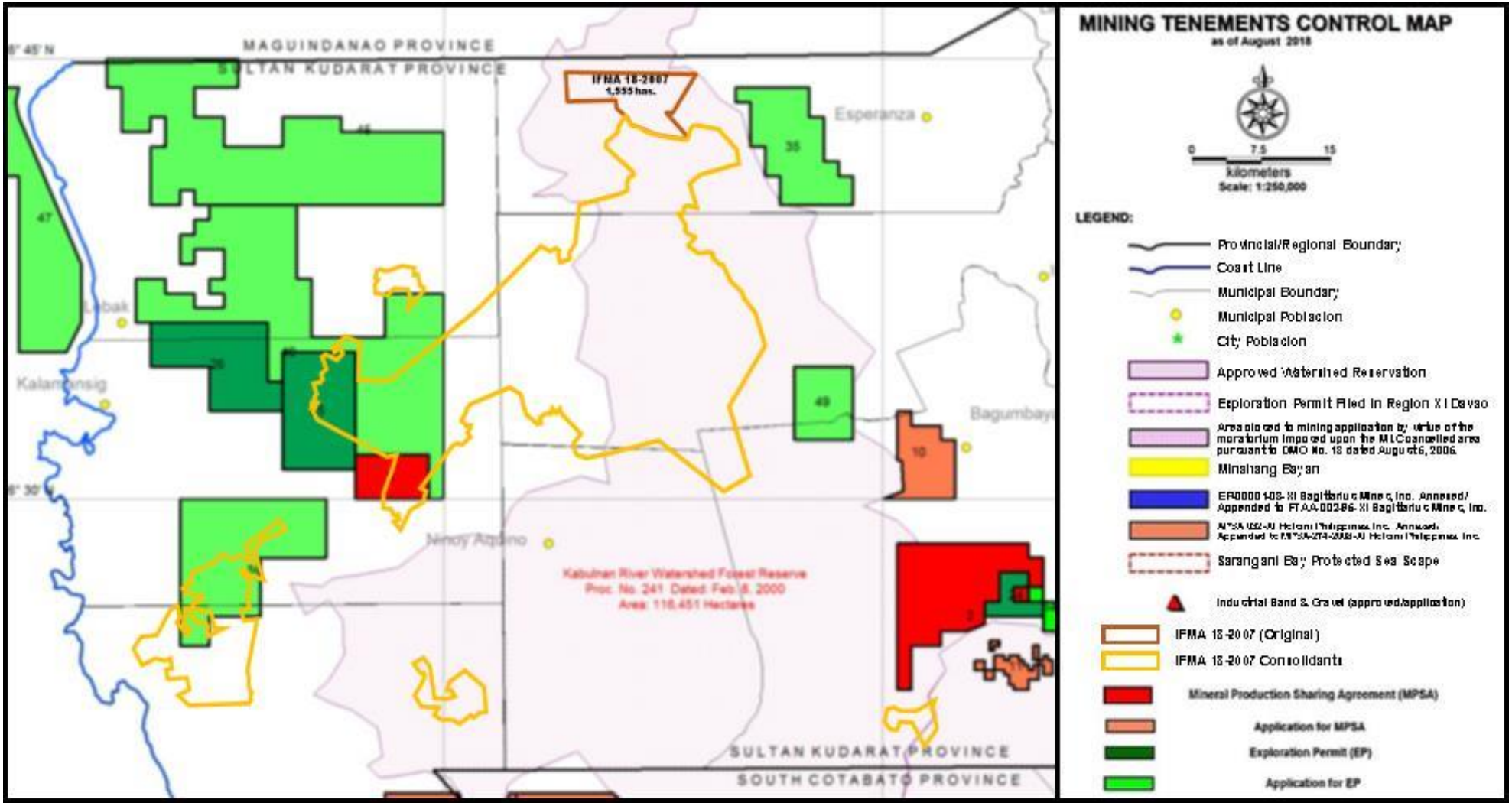
*Map 1-9. CADT Areas near Project Area*




*Source: 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**Error! No text of specified style in document.**-10. Mining Tenements Map*




*Source: MGB Region XII*

2.1.1.2 Geology/Geomorphology

*2.1.1.2.1 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 1-8. Land Area by Slope Category, Province of Sultan Kudarat*

| Description | Slope Range | Area (Has.) | % |
|---|---|---|---|
| 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 |

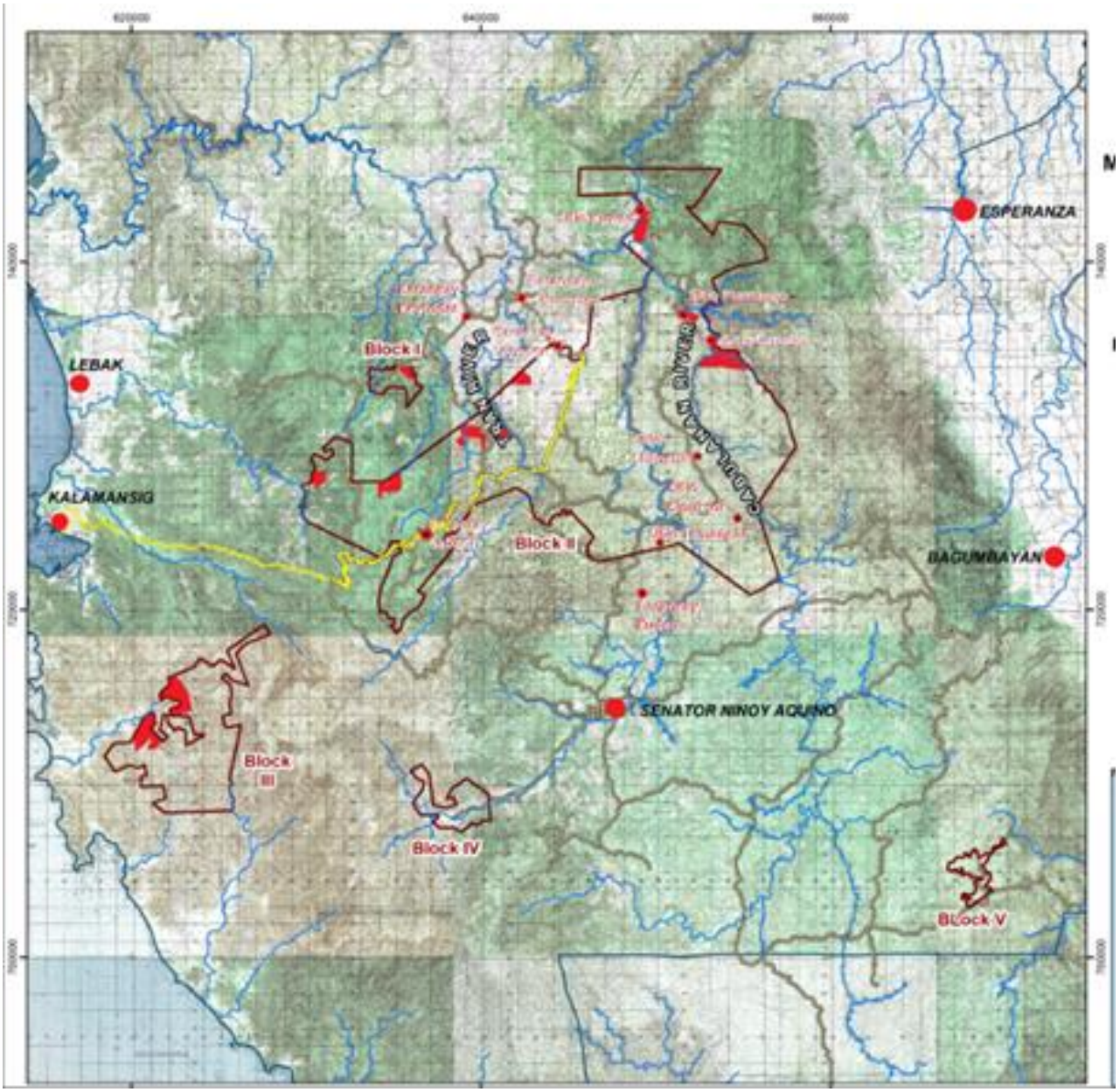
*Source: 2010 Socio-Economic Profile, Sultan Kudarat Province*

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**Error! No text of specified style in document.**-11. Topographic Map*



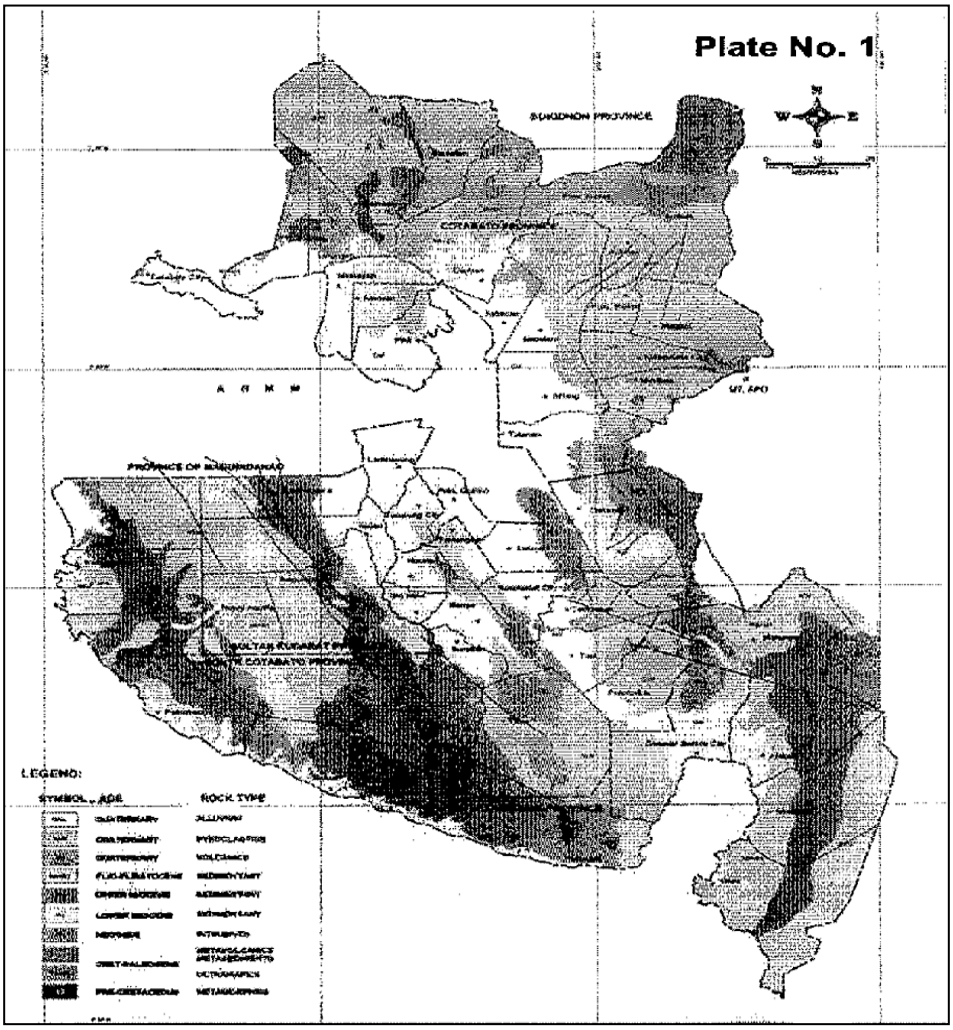

*Source: NAMRIA*

*2.1.1.2.2 Regional/General Geology*

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).

The Cretaceous-Paleogene rocks consist of undifferentiated metamorphosed sedimentary rocks mainly metashale and is associated with basaltic flows and agglomerates and thinly bedded indurated shale. Bedding planes are poorly developed and may grade into schistosity by further metamorphism. Along sheared zones, schistose structures are highly developed. Silica replacement is extensive giving rise to cherty and flinty metasediments. This formation underlies the Daguma and Southwest Coast Ranges in the west-central and western parts of the province.

*Map **Error! No text of specified style in document.**-12. Geologic Map of Region XII*



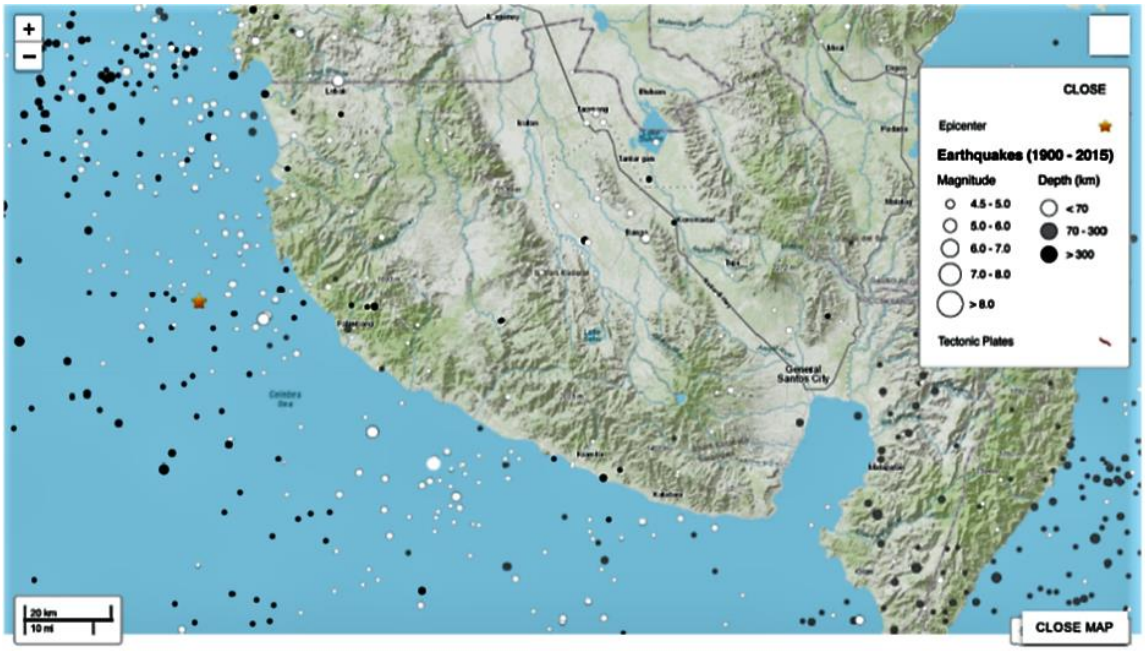

*Source:* Feasibility Study of Kabulnan-2 Multipurpose Irrigation and Power Project, *https://ppp.gov.ph/wp-content/uploads/2011/05/KabulnanVol3.pdf, Accessed 10/25/18.*

*2.1.1.2.3 Regional Seismicity*

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 1-13. 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.

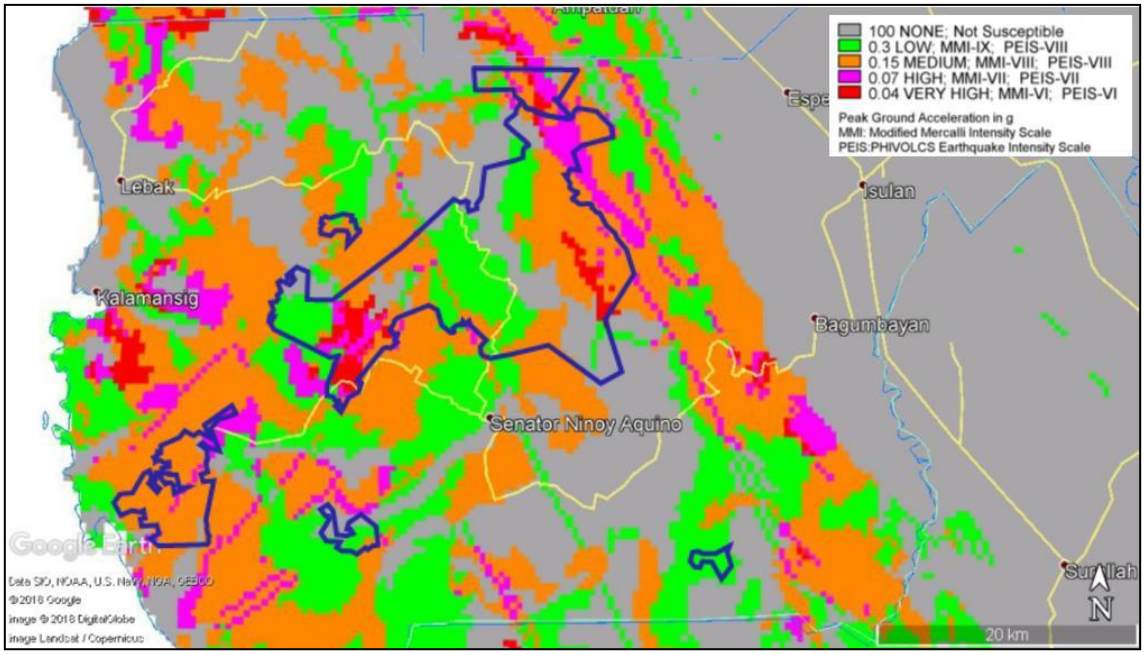
*2.1.1.2.4 Geologic Hazards*

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 rapture/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.**

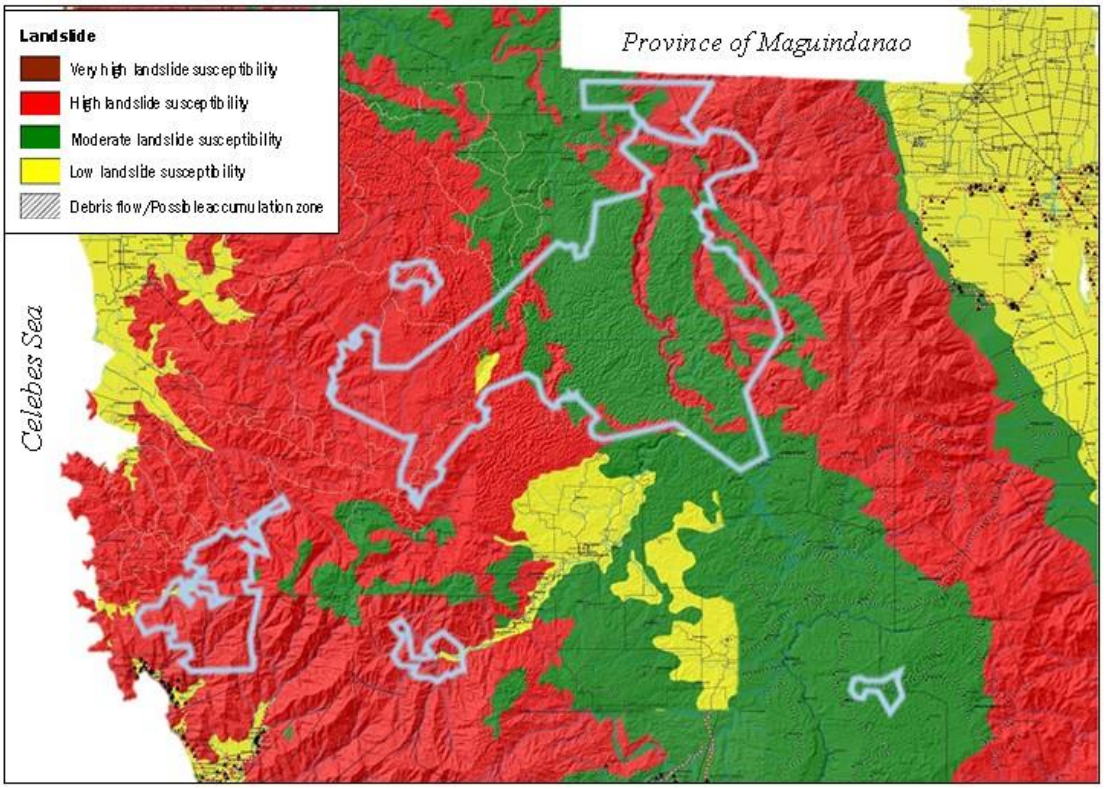
*Map 1-14. Earthquake-Triggered Landslide Susceptibility Map*




*Source: PhiVOLCS*

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 1-15. Landslide Susceptibility Map*




*Source: Mines and Geosciences Bureau www.mgb.gov.ph*

2.1.1.3 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**Error! No text of specified style in document.**-9. Results of Analysis for Soil Samples - Survey Conducted March 2015*

| | | % | PARTS PER MILLION (PPM) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIT # | pH | 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 1-10. Results of Analysis for Soil Samples, Survey Conducted on December 5, 2012*

| Pit | Project Site/ Year Establlshed | | % | meq | Parts Per Million (PPM) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | pH | OM | Al | P | S | K | Ca | Mg | Na | Mn | Zn | Fe | Cu | B |
| 1 | Guimaras Blk 1 | 7.19 | 4.28 | 0.161 | 18 | 238 | 342.2 | 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 | 113 | 149.2 | 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 | 210 | 119.0 | 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 | 120 | 150.8 | 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 | 145 | 394.5 | 5,799 | 725.2 | 140.73 | 153.75 | 5.35 | 10.11 | 1.15 | 1.34 |
| 6 | Simsimon | 5.65 | 5.19 | 0.107 | 6 | 190 | 182.4 | 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 | 235 | 269.9 | 4,196 | 428.2 | 75.77 | 36.48 | 2.28 | 9.64 | 1.40 | 2.96 |
| 8 | Granary 2008 | 5.72 | 5.00 | 0.107 | 22 | 225 | 324.8 | 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 | 205 | 451.4 | 2,940 | 524.2 | 62.73 | 40.51 | 3.89 | 25.28 | 1.45 | 1.69 |
| 10 | Farmlot 2008 | 5.61 | 5.00 | 0.107 | 6 | 145 | 233.5 | 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 | 205 | 427.4 | 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 | 158 | 234.8 | 3,088 | 424.7 | 44.01 | 69.30 | 7.56 | 27.92 | 1.31 | 2.39 |
| 13 | Panther | 6.25 | 5.00 | ND | 19 | 213 | 319.8 | 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 | 188 | 332.5 | 3,843 | 680.3 | 70.90 | 59.12 | 3.53 | 25.53 | 1.56 | 3.80 |
| 15 | Rojoyor 2001 | 5.5 | 4.3 | 0.05 | 4 | 19 | 152. | 2,64 | 532.0 | 43.80 | 19.01 | 1.38 | 20.8 | 2.0 | 3.1 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9 | 4 | 4 | | 8 | 9 | 0 | | | | | 6 | 3 | 7 |
| 16 | Rojoyor 2008 | 5.40 | 4.60 | 0.642 | 3 | 200 | 273.6 | 2,788 | 981.9 | 64.64 | 29.72 | 1.84 | 18.10 | 1.67 | 2.32 |
| 17 | Zambales 2009 | 5.88 | 4.34 | 0.535 | 1 | 223 | 119.7 | 2,090 | 411.9 | 60.76 | 24.34 | 0.88 | 16.35 | 1.61 | 1.69 |
| 18 | Canete 2009 | 5.62 | 4.73 | 0.214 | 3 | 258 | 262.8 | 3,413 | 692.1 | 61.96 | 41.12 | 1.73 | 18.39 | 1.28 | 2.111 |
| 19 | Mangium (Coffee) Vietnam | 5.20 | 5.10 | 2.461 | 4 | 183 | 411.3 | 5,473 | 1269.1 | 71.17 | 30.71 | 3.19 | 25.60 | 0.98 | 1.97 |
| 20 | Mangium (Coffee) Nestle Robusta | 5.84 | 4.61 | ND | 10 | 163 | 321.9 | 2,786 | 515.7 | 68.49 | 49.44 | 2.40 | 29.98 | 1.56 | 2.111 |

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.

### 2.1.1.4 Terrestrial Ecology

#### *2.1.1.4.1 Vegetative Cover*

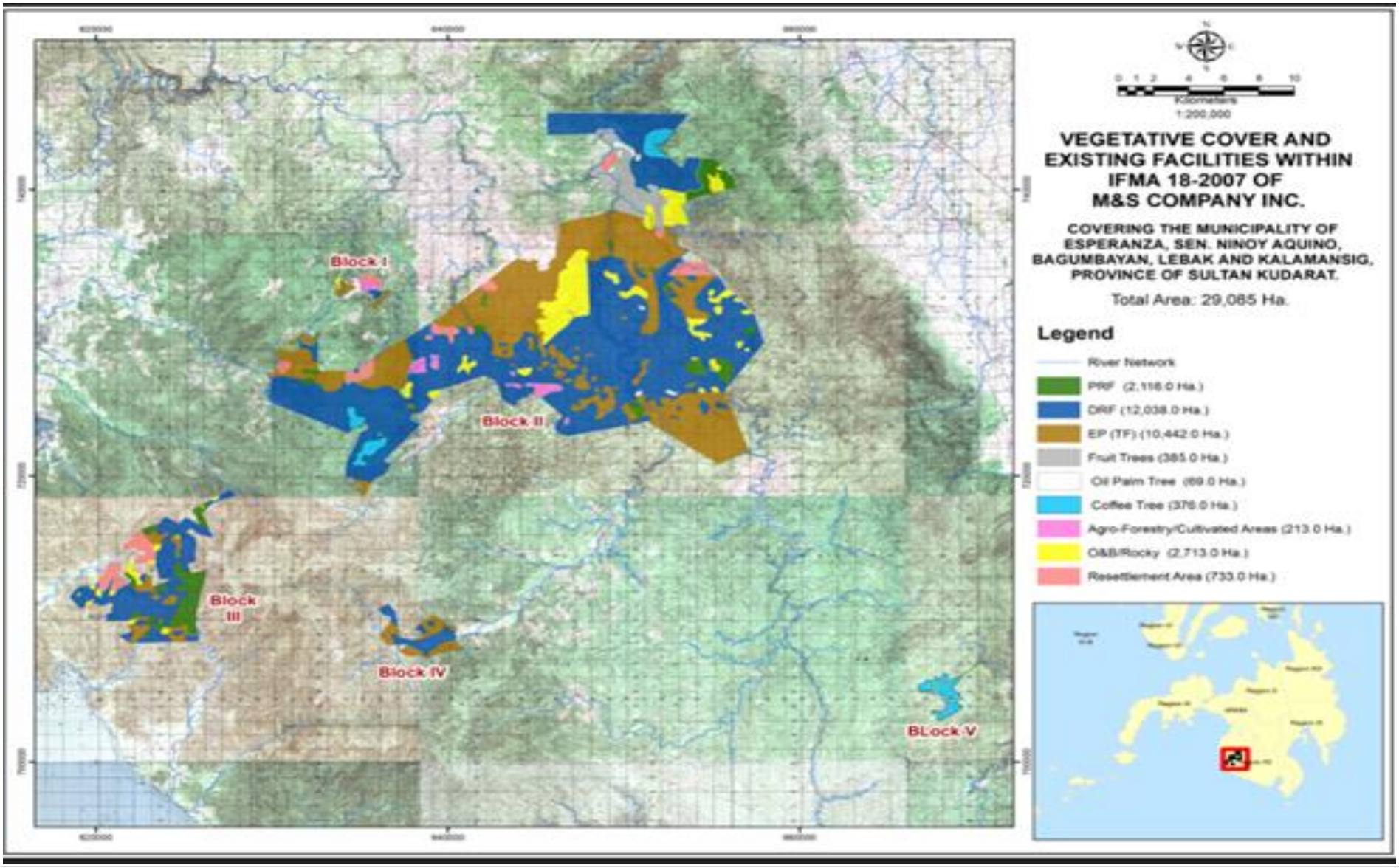
The dominant vegetation type in the Consolidated Project Area is degraded residual forest (DRF) at 53.8% of the total project area followed by established plantation at 26.5% and brushland/rocky area at 10.4%. Agroforestry areas constitute 4.4% while production residual forest constitute only 2.4%. The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

*Table 1**Error! No text of specified style in document.**-11. Vegetative Cover in the Project Area*

| Vegetative Cover/Land Use | Area (Has.) | % to Total |
|---|---|---|
| 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 |
| **Total** | **29,085** | **100.0** |

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 1-16. Vegetative Cover in the Project Area*



*2.1.1.4.2 Terrestrial Flora*

2.1.1.4.2.1 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:

$$\text{Density} = \frac{\text{number of Individuals}}{\text{area sampled}}$$

$$\text{Relative Density} = \frac{\text{density for a species}}{\text{total density for all species}} \times 100$$

$$\text{Frequency} = \frac{\text{number of plots in which species occur}}{\text{total number of plots sampled}}$$

$$\text{Relative Frequency} = \frac{\text{frequency value for a species}}{\text{total frequency for all species}} \times 100$$

$$\text{Dominance} = \frac{\text{basal area or volume for a species}}{\text{area sampled}}$$

$$\text{Relative Dominance} = \frac{\text{dominance for a species}}{\text{total dominance for all species}} \times 100$$

Importance Value = Relative Density + Relative Frequency + Relative Dominance

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:

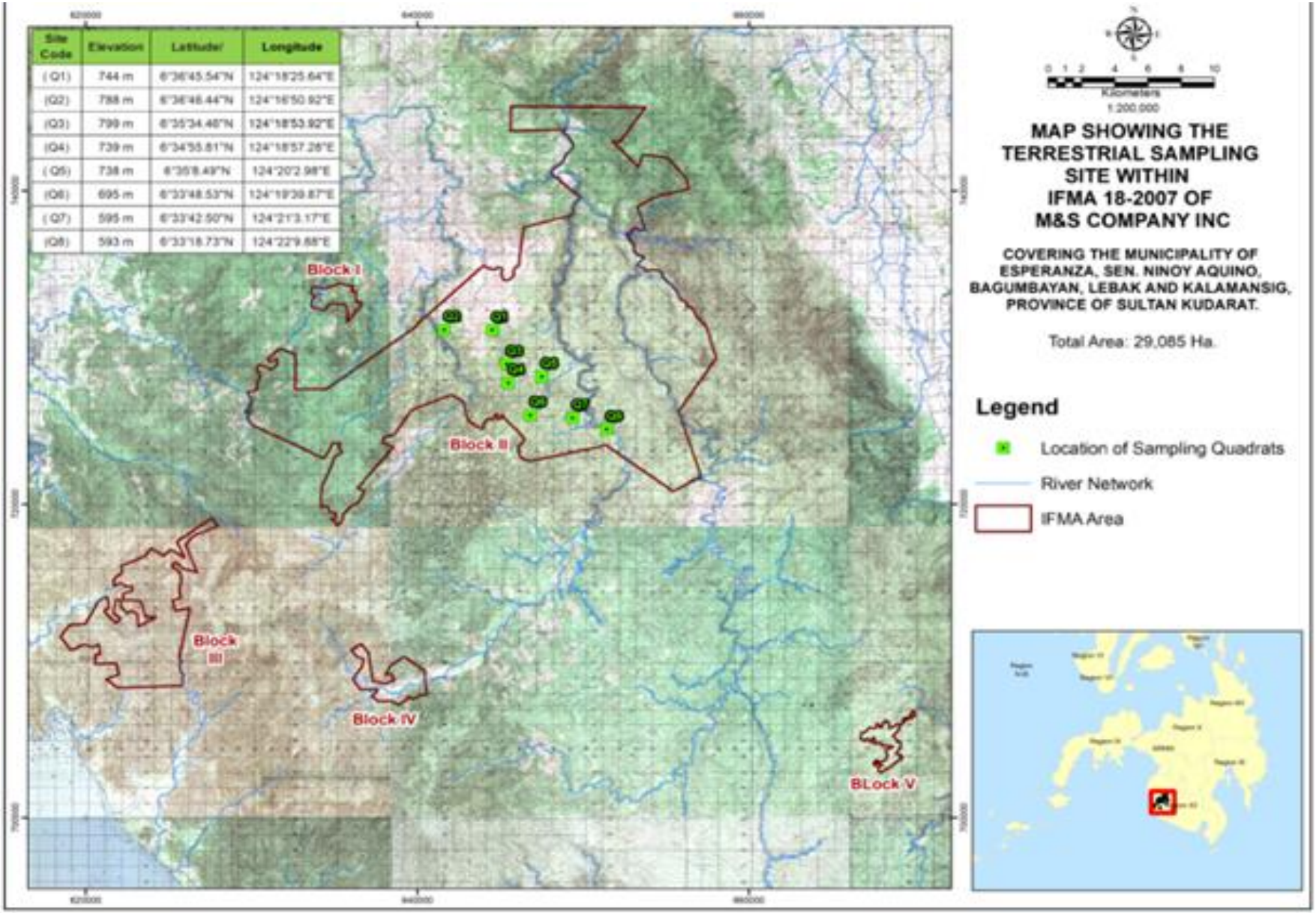
where:
ni = the total number of individuals in each species
N = the total number of all individuals

where:
S = total number of species

*Table 1-12. 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 **Error! No text of specified style in document.**-17. Terrestrial Sampling Map*



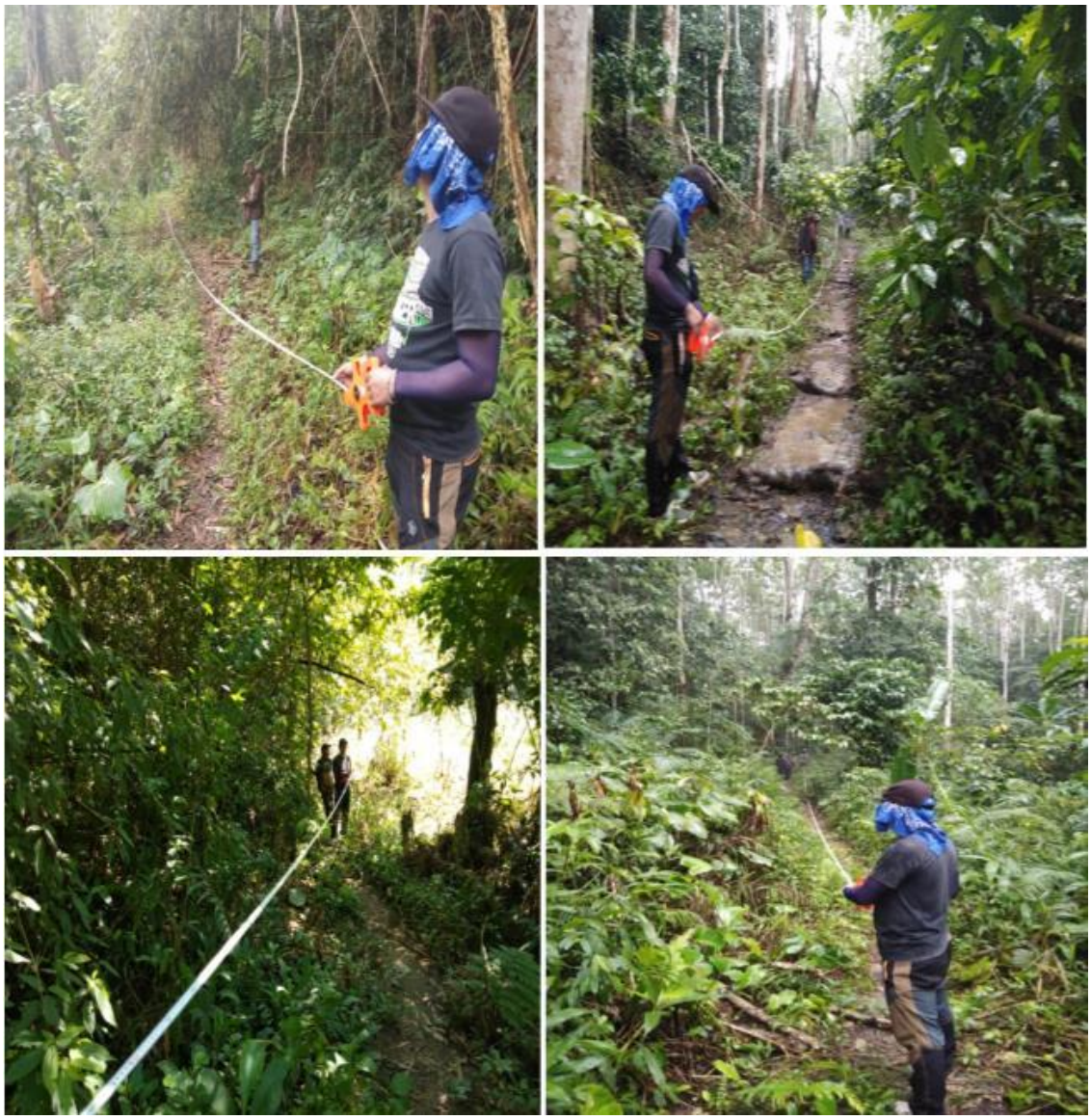


*Photo **Error! No text of specified style in document.**-3. Photos taken during the establishment of transect lines and quadrats that will serve as the observation points during the conduct of terrestrial assessment in the area.*

*Photo **Error! No text of specified style in document.**-4. Photos taken during the measurement of Diameter at Breast Height (DBH) of trees sighted at the M& S IFMA area.*

2.1.1.4.2.2 Results and Discussion

*2.1.1.4.2.2.1 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 1-13. Vegetative Cover of M & S IFMA No. 18-2007*

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

**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*

*Photo1-6. Panoramic view of the closed canopy to open-canopy forest dominated with Paraserianthes falcataria, Gmelina arboria and Dipterocarpaceae species. The Quadrat 2 was established within the tree plantation of M & S at Omega area.*

*Photo **Error! No text of specified style in document.**-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**Error! No text of specified style in document.**-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.*

*2.1.1.4.2.2.2 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 **Error! No text of specified style in document.**-14. Summary of species composition*

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

The most speciose (having several species) of all ninety-three (93) families recorded are *Euphorbiaceae* with fifteen (15) followed by *Fabacea* with thirteen (13) species, *Moracea* 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 **Error! No text of specified style in document.**-15. List of tree species recorded in M & S IFMA Area, Sultan Kudarat*

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

| | | | |
|---|---|---|---|
| 30 | Hagakhak | *Dipterocarpus Validus* | Dipterocarpaceae |

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

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

| | | | |
|---|---|---|---|
| 79 | Malatungao | *Melastoma polyanthia* | Melastomotaceae |
| 80 | Lanzones | *Lansium domesticum* | Meliaceae |
| 81 | Gmelina | *Gmelina arboria* | Meliaceae |
| 82 | Bagalunga | *Melia dubia* | Meliaceae |

Table 2-10: List of Tree Species, continued

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

| | | | |
|---|---|---|---|
| 130 | Alupag | *Euphoria didyma* | Sapindaceae |
| 131 | Balit | *Erioglossum rubiginosum* | Sapindaceae |
| 132 | Kusibeng | *Sapindus saponaria* | Sapindaceae |
| 133 | Loktob | *Duabanba moluccana* | Sonneratiaceae |
| 134 | Cacao | *Theobroma cacao* | Stercullaceae |

Table 2-10: List of Tree Species, end

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

*Table **Error! No text of specified style in document.**1-16. 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 |
|---|---|---|---|
| **A. Epiphytes** | | | |
| 1. | Broom Pork Moss | *Homalothecium sericeum* | Brachytheciaceae |
| 2. | Pocket Moss | *Fissidens taxifolius* | Fissidentaceae |
| 3. | Ground Orchid | *Spathoglottis plicata* | Orchidaceae |
| 4. | Wild Waling-waling | *Vanda sanderiana* | Orchidaceae |
| **B. Pterophytes/Ferns** | | | |
| 1. | Pakong Alakdan | *Blechnum oriente L.* | Blechnaceae |
| 2. | Pako-pako | *Blechnum fraseli L.* | Blechnaceae |
| 3. | Tree Fern | *Cyathea contaminans* | Blechnaceae |
| 4. | Hagnaya | *Stenochalaena mitnei Underw.* | Blechnaceae |
| 5. | Agsam | *Dicranopteris linearis ( Burm.f.)* | Gleicheniaceae |
| 6. | Kilob | *Gleichenia linearis* Burm | Gleicheniaceae |
| 7. | Pako | *Athyrium esculentum* | Polypodiaceae |
| 8 | Bird's nest fern | *Asplenium nidus Linn.* | Psilotaceae |

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

*Table **Error! No text of specified style in document.**-17. List of the recorded tree species with highest Importance Value (IV)*

| Rank | Common Name | *Scientific Name* | Family Name | Importance Value (IV) |
|---|---|---|---|---|
| 1 | Falcata | *Paraserianthes falcataria* | Fabaceae | 126.275 |

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

*2.1.1.4.2.2.3 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 plantaion 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**Error! No text of specified style in document.**-18. 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 |

*2.1.1.4.2.2.4 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 **Error! No text of specified style in document.**-19. List of endemic species recorded in M & S IFMA Area, Sultan Kudarat*

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

| | | | |
|---|---|---|---|
| 20 | Malabayabas | *Tristania decorticate* | Myrtaceae |

Table 2-14: List of endemic species, end

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

*2.1.1.4.2.2.5 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 **Error! No text of specified style in document.**-20. 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 | *Hopea philipinensis* | Dipterocarpaceae | Critically Endangered | Quadrat 3, 5 |
| 2 | Yakal | *Shorea Astylosa* | Dipterocarpaceae | Critically Endangered | Quadrat 3 |
| 3 | Tree Fern | *Cyathea contaminans* | Cyatheaceae | Endangered | Quadrat 1,2,3,5,6,8 |
| 4 | Tindalo | *Afzelia rhomboidea* | Fabaceae | Endangered | Quadrat 5,6 |
| 5 | Igem | *Podocarpus philippinensis* | Podocarpaceae | Endangered | Quadrat 5,6 |
| 6 | Molave | *Vitex parviflora* | Verbenaceae | Endangered | Quadrat 4,5 |
| 7 | Narra | *Pterocarpus* | Fabaceae | Vulnerable | Quadrat 5,6 |

| | | | | | |
|---|---|---|---|---|---|
| | | *indicus* | | | |
| 8 | Katmon | *Dillenia philippinensis* | Dilleniaceae | Vunerable | Quadrat 3, 7 |
| 9 | Almon | *Shorea almon* | Dipterocarpaceae | Vulnerable | Quadrat 8 |
| 10 | Bagtikan | *Parashorea malaanonan* | 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 | *Shorea contorta* | Dipterocarpaceae | Vulnerable | Quadrat 3,5,6, 7 |
| 12 | Red Lauan | *Shorea negrensis* | Dipterocarpaceae | Vulnerable | Quadrat 3, 7 |
| 13 | Taguile | *Shorea polysperma* | Dipterocarpaceae | Vulnerable | Quadrat 7 |
| 14 | Anibong | *Oncosperma tigilarium* | Arecaceae | Vulnerable | Quadrat 3,6,7 |
| 15 | Pahutan | *Mangifera monandra* | Anacardiaceae | Vulnerable | Quadrat 2 |
| 16 | Antipolo | *Artocarpus blancoi* | Moraceae | Vulnerable | Quadrat 1, 2, 6 |
| 17 | Badiang | *Alocasia macrorrhiza L. Schott* | Araceae | Vulnerable | Quadrat 2,5,6,7 |
| 18 | Kalantas | *Toona calantas* | Meliaceae | Vulnerable | Quadrat 5,6 |
| 19 | Banuyo | *Wallaceodendron cellibicum* | Fabaceae | Vulnerable | Quadrat 3 |
| 20 | Malabayabas | *Tristania decorticata* | Myrtaceae | Vulnerable | Quadrat 3, 6 |
| 21 | Alupag | *Euphoria didyma* | Sapindaceae | Vulnerable | Quadrat 3, 7 |
| 22 | Palasan | *Calamus merrillii Becc.* | Arecaceae | Other Threatened Species | Quadrat 1, 2,3, 5, 7 |
| 23 | Limuran | *Calamus ornatus Blume* | Arecaceae | Other Threatened Species | Quadrat 3, 7 |
| 24 | Kalingag | *Cinnamomum mercadoi* | Lauraceae | Other Threatened Species | Quadrat 5, 6 |
| 25 | Duguan | *Myristica philippinensis* | Myristicaceae | Other Threatened Species | Quadrat 5, 6 |

*2.1.1.4.2.2.6 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.

*2.1.1.4.3 Terrestrial Fauna*

2.1.1.4.3.1 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.

*2.1.1.4.3.1.1 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 Mc Leod *et. al.,* 2011 for reptiles. Journals and materials in the worldwide web also aided in the identification of species.

2.1.1.4.3.1.1.1 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 were 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.

2.1.1.4.3.1.1.2 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 was 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.

2.1.1.4.3.1.1.3 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 observes, and the (iv) point at 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 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 **Error! No text of specified style in document.**-13. MCSi researchers install "snap traps" in the suspected runways.*

2.1.1.4.3.1.1.4 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.

*2.1.1.4.3.1.2 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'):

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

where:
S = the total number of observed species,
*i* = the species number, and
*pi* = the proportion of individuals of the total sample belonging to the *ith* 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 = In 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 endemicity provides a broad evaluation of the importance of the area being a habitat for unique species (Ibañez, 2010).

### 2.1.1.4.3.2 Results and Discussion

#### ***2.1.1.4.3.2.1*** *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. Howver, M&S Company was successful in protecting this species. These species roost near the M & S field office at Sitio Plamango, Brgy. Pamantingan.

*Table **Error! No text of specified style in document.**-21. Summary of species richness of terrestrial fauna recorded in the M & S IFMA monitoring survey*

| CLASSIFIED FAUNA | Number of Individuals | Number of Species | Shannon H' (Index) | Evenness Index |
|---|---|---|---|---|
| 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 1-22. 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 |
|---|---|---|---|
| **Mammals** | | | |
| 1. Phil. Monkey | Unggoy | Macaca fasicularis | Vulnerable |
| 2. Greater Musky Fruit Bat | Kwaknit | *Ptenochirus Jagori* | Least Concern |
| 3. Lesser Musky Fruit bat | Kwaknit | *Ptenochirus Minor* | Least Concern |
| 4. Long-tongue nectar bat | Kwaknit | *Macroglossus Minumus* | Least Concern |
| 5. Lesser short-nosed fruit bat | Kwaknit | *Cynopterus Brachyoris* | Least Concern |
| 6. Philippine Dawn Bat | Kwaknit | *Eonycteris robusta* | Near Threatened |
| 7. Phil.Flying Lemur | Kagwang | *Cynocephalus volans* | Threatened |
| 8. Phil. Palm Civet | Milo | *Paradoxurus philippinensis* | Vulnerable |
| 9. Forest Rat | Ilaga | *Rattus everetti.* | Abundant |
| 10. Phil. Tree Squirrel | | *Callosciurus sp.* | Vulnerable |
| **Reptiles** | | | |
| 1. Reticulated Phyton | Sawa | *Paython reticulatus* | Abundant |
| 2. Phil. Sailfin Lizard | Ibid | Hydrosaurus pustulatus | Threatened Species |
| 3. Monitor lizard | Halo | *Varanus Salvador* | Vulnerable |
| 4. Phil. Cobra | Banakon | *Naja naja philippinensis* | Abundant |
| 5. Gecko | Tuko | *Gecko gecko* | Abundant |
| 6. Phi. Skink | Tabili | *Lamprolepis smaragdina philippinica* | Abundant |
| Flying Lizard | Hambubukag | *Draco vlans* | Vulnerable |
| **Amphibians** | | | |
| 1. Frog | Palaka | *Rana magna* | Abundant |
| 2. Toad | Bakbak | *Bufo marinus* | Abundant |
| 3. Forest Tree Frog | Kogat | *Rana sp.* | Abundant |

*2.1.1.4.3.2.2 Endemicity*

In terms of endemicity 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 1-23. List of Endemic species in M & S IFMA with Species Distribution and Conservation Status.*

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

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


*Photo* ***Error! No text of specified style in document.****-14. Endemic bird species observed within the M & S IFMA station including* Macronus striaticeps

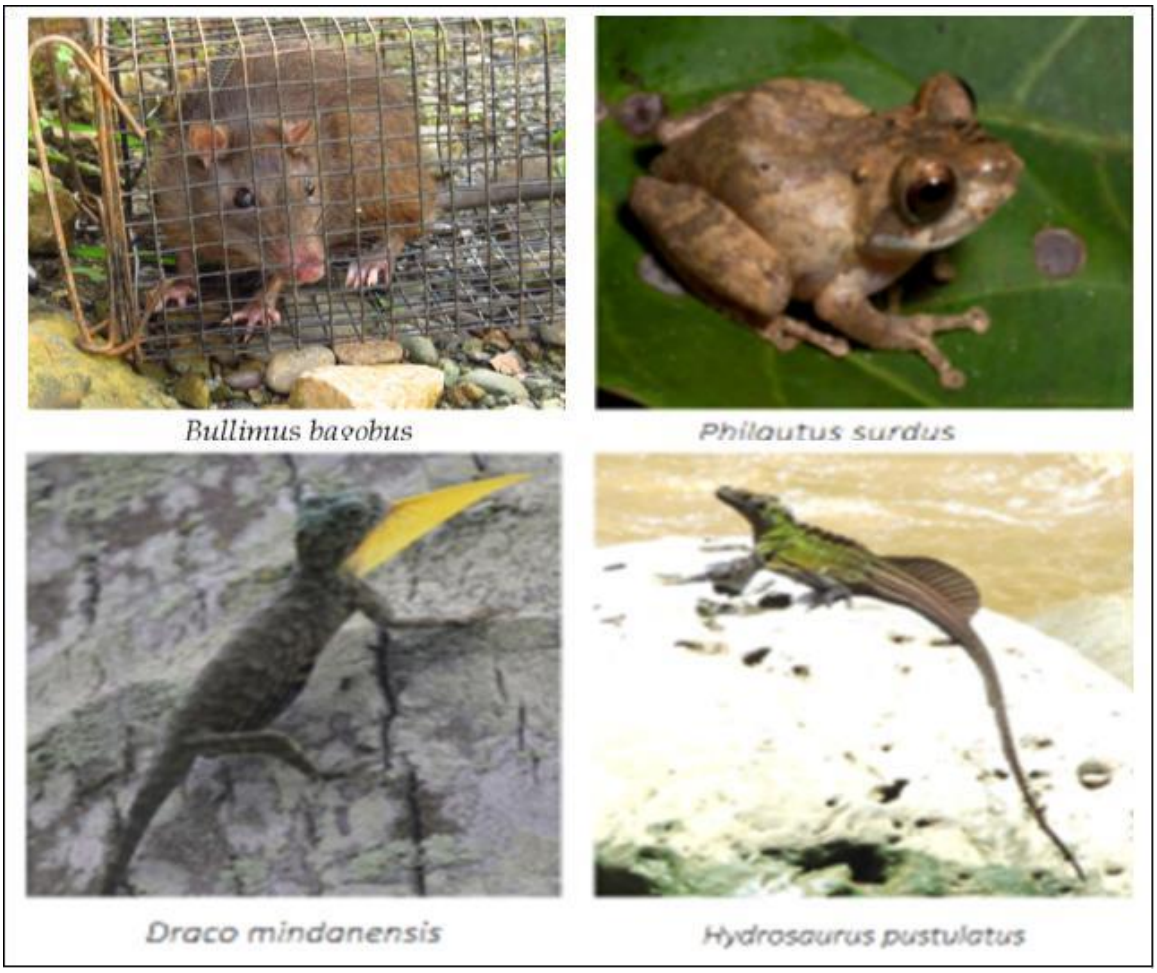



*Photo **Error! No text of specified style in document.**-15. Non-flying mammals, amphibians and reptiles within the vicinity of M & S IFMA station.*


*Photo **Error! No text of specified style in document.**-16. Flying mammals* Ptenochirus jagori *and* Ptenochirus minor *of M & S IFMA station.*

*2.1.1.4.3.2.3 Birds*

2.1.1.4.3.2.3.1 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 1-24. 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 1-25. Overall Avifauna species that were seen, heard and captured by camera within the area.*

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

Table 2-20: Overall Avifauna species, end

| *FAMILY* | *SCIENTIFIC NAME* | *T1* | *T2* | *ALL* | *R* | *IUCN* |
|---|---|---|---|---|---|---|
| *Rhipiduridae* | *Rhipidura javanica* (Sparrman, 1788) | 5 | 0 | 5 | R | LC |
| | *Spilopelia chinensis* (Scopoli, 1786) | 0 | 1 | 1 | R | LC |
| *Sturnidae* | *Sarcops calvus* | 0 | 20 | 20 | NE | LC |
| *Timaliidae* | *Macronus striaticeps* | 1 | 0 | 1 | E | LC |


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

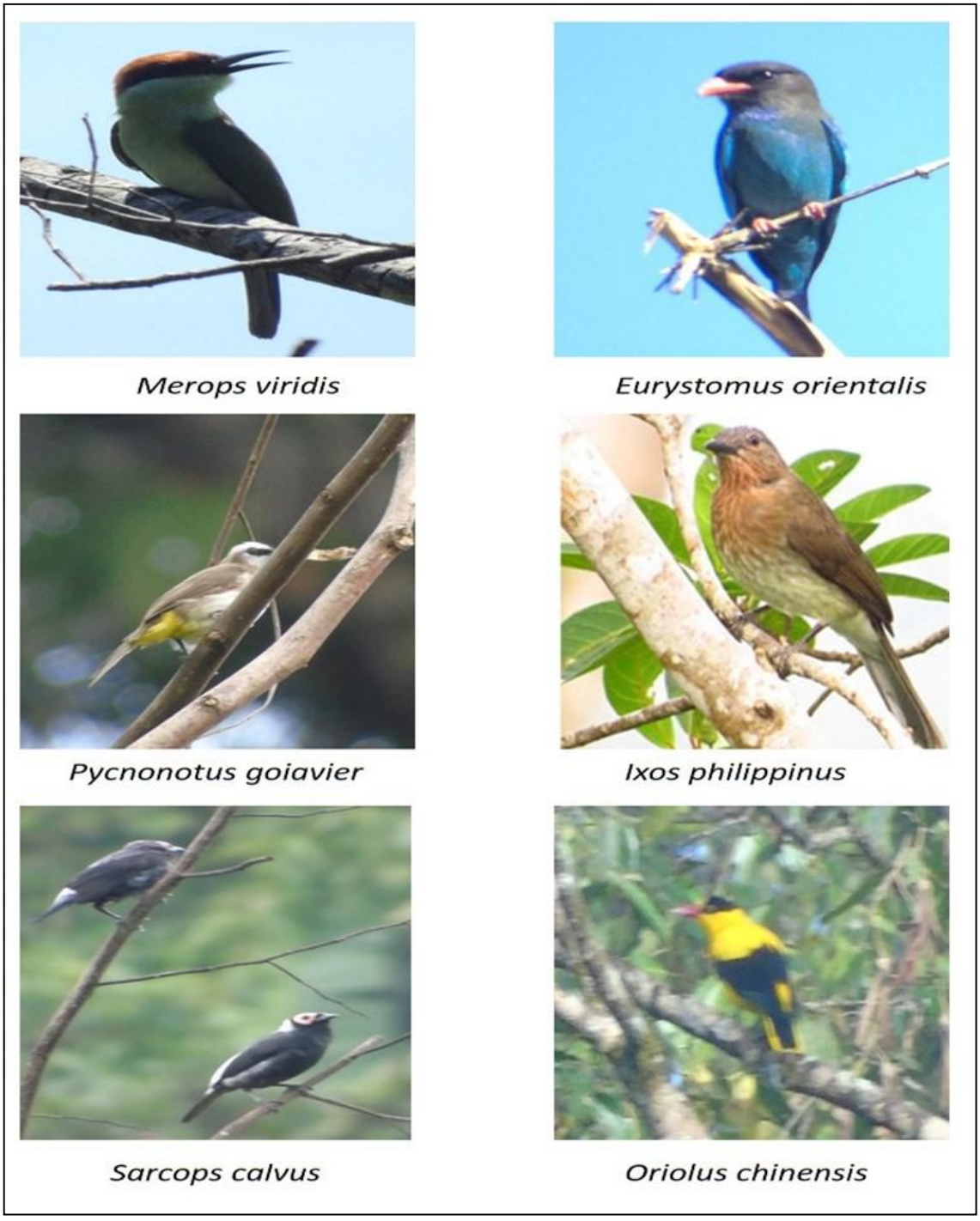


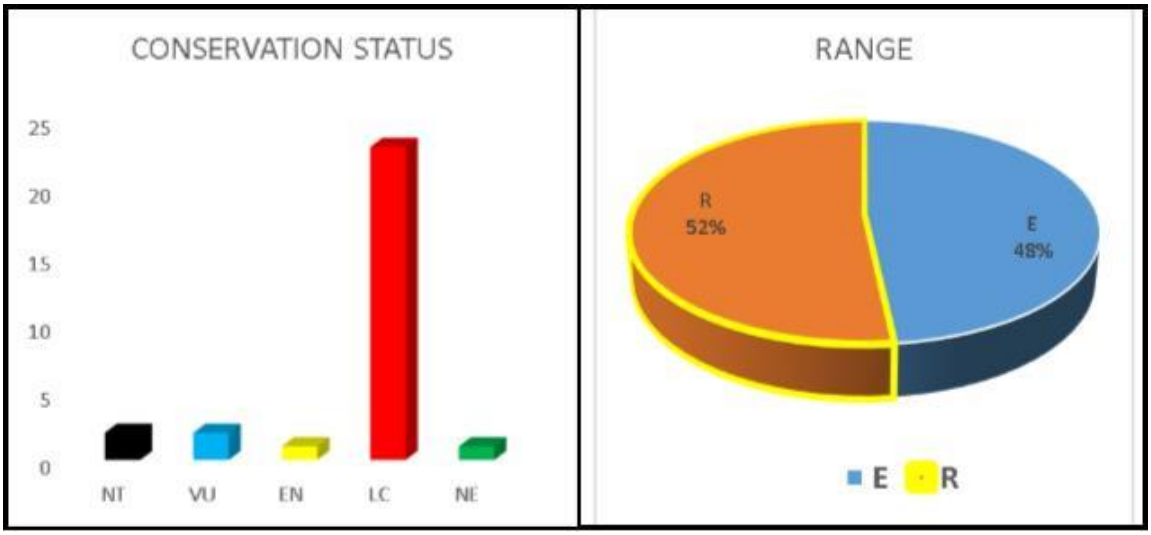

*Photo 1-18. Birds captured by cameras within the M & S IFMA area.*

2.1.1.4.3.2.3.2 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, Coleto (*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 observes 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 endemicity was based on the IUCN Red List of Threatened Species.

*Figure **Error! No text of specified style in document.**-1. Conservation status and endemicity 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 endemicity, E means (endemic) and R is for Resident.*

*2.1.1.4.3.2.4 Bats (Flying mammals)*

2.1.1.4.3.2.4.1 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 1-26. Diversity of Bats in M & S IFMA area.*

| Species | Number of Individuals | Relative abundance | Shannon H' (Index) | Evenness Index |
|---|---|---|---|---|
| *Cynopterus brachyotis* | 16 | 30.19 | 0.6365 | 0.94 |
| *Eonycteris robusta* | 12 | 22.64 | 0.6365 | 0.94 |
| *Eonycteris spelaea* | 5 | 9.43 | 0.6730 | 0.98 |
| *Macroglossus minimus* | 6 | 11.32 | 0.6931 | 1 |
| *Ptenochirus jagori* | 7 | 13.21 | 0.6829 | 0.98 |
| *Ptenochirus minor* | 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 1-27. 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 |
|---|---|
| *Cynopterus brachyotis* | Non-Endemic |
| *Ptenochirus jagori* | Philippine Endemic |
| *Eonycteris robusta* | Philippine Endemic |
| *Eonycteris spelaea* | Non-Endemic |
| *Macroglossus minimus* | Non-Endemic |
| *Ptenochirus minor* | Philippine Endemic |
| *Pteropus vamphyrus* | Non-Endemic (Near threatened) |

Most of the bat species were identified as least concern except for the *Pteropus vamphyrus* 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 vamphyrus) 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). Volant mammals

2.1.1.4.3.2.4.2 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 **Error! No text of specified style in document.**-28. List of detected non-flying mammals.*

| | | Range | DAO 2004-15 | T1 | T2 | Total |
|---|---|---|---|---|---|---|
| 1 | *Rattus everetti* | 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*

*2.1.1.4.3.2.5 Amphibians*

2.1.1.4.3.2.5.1 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 Rhacoporidae were also represented with one species each, namely *Hylarana grandocula* and *Polypedates leucomystax.* The species *P. leucomystax* and *O. laevis* have lower abundance.

*Table **Error! No text of specified style in document.**-29. List of detected amphibians.*

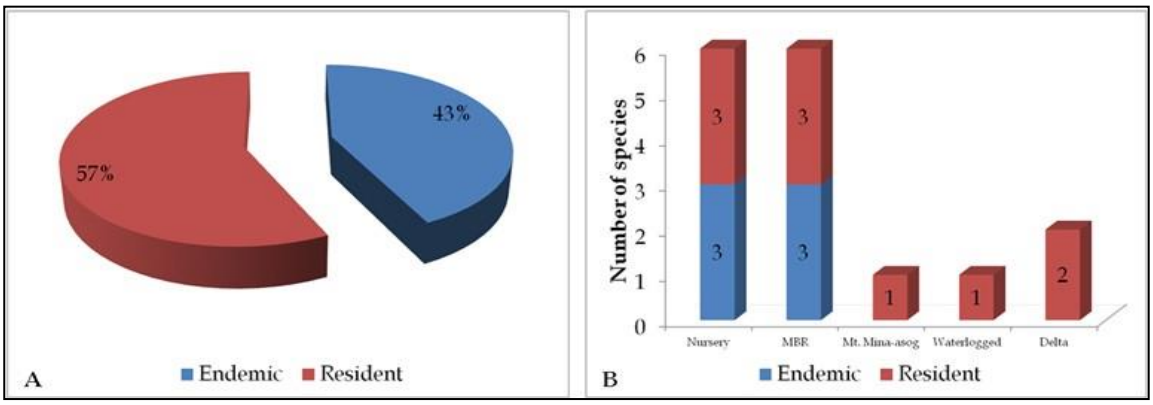
| | | Range | DAO 2004-15 | T1 | T2 | Total |
|---|---|---|---|---|---|---|
| | Family Bufonidae | | | | | |
| 1 | *Rhinella marina* (Linnaeus, 1758) Cane Toad | R | Not Listed | 100 | 67 | 167 |
| | Family Ceratobatrachidae | | | | | |
| 2 | *Fejervarya moodiei* (Dubois and Ohler, 2000) Asian Brackish Frog | E | Not Listed | 93 | 40 | 133 |
| 3 | *Limnonectes magnus* (Stejneger, 1909) Giant Philippine Frog | E | Vulnerable | 150 | 33 | 183 |
| 4 | *Occidozyga laevis* (Günther, 1858) Common Puddle Frog | R | Not Listed | 15 | 18 | 33 |
| | Family Ranidae | | | | | |
| 5 | *Hylarana* grandocula (Taylor, 1920) Big-eyed frog | E | Not Listed | 57 | 60 | 117 |
| | Family Rhacophoridae | | | | | |
| 6 | *Polypedates leucomystax (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, *Limnonactes magnus* is highly dominant in number as it can easily reproduce far away from threats of human activities.

2.1.1.4.3.2.5.2 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.

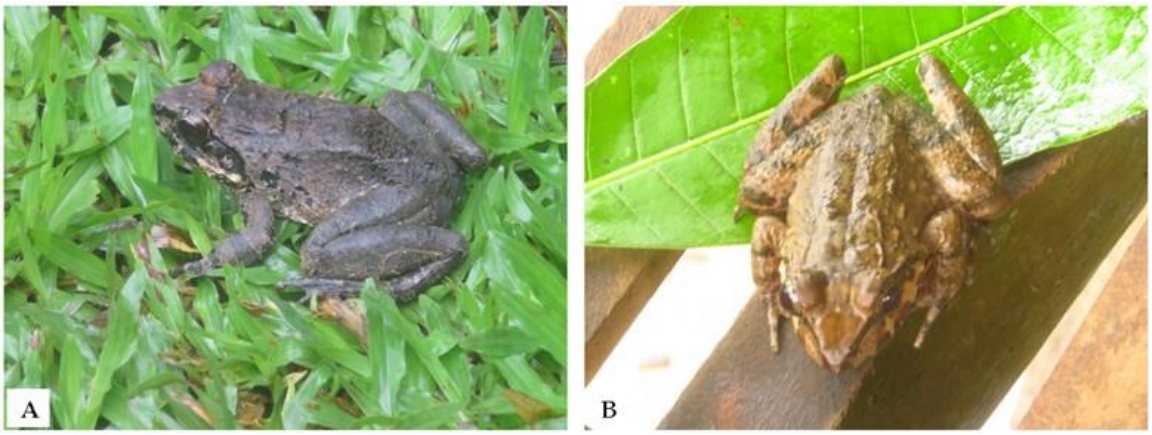



*Photo **Error! No text of specified style in document.**-21. Photographs in life of **A)*** Limnonectes magnus *and **B**)* Fejervary moodiei *observed within the M & S IFMA premises.*

*2.1.1.4.3.2.6 Reptiles*

2.1.1.4.3.2.6.1 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 Phytonidae was also observed.

*Table **Error! No text of specified style in document.**-30. List of reptiles detected in the recent assessment.*

| | | Range | DAO 2004-15 | T1 | T2 | Total |
|---|---|---|---|---|---|---|
| | Family Agamidae | | | | | |
| 1 | *Draco volans* (Linnaeus, 1758) Common Flying Dragon | R | Not Listed | 50 | 0 | 50 |
| 2 | *Hydrosaurus pustulatus* (Eschscholtz, 1829) Philippine Sailfin Lizard | E | OTS | 83 | 0 | 83 |
| | Family Colubridae | | | | | |
| 3 | *Ahaetulla prasina preocularis* (Taylor, 1922) Asian Vine Snake | R | Not Listed | 13 | 20 | 33 |
| 4 | *Oxyrhadum modestum* Philippine shrub snake | E | Least concern | | 33 | 33 |
| | Family Phytonidae | | | | | |
| 5 | *Python reticulatus* (Linnaeus, 1758) Python | R | Not Listed | 17 | 0 | 17 |
| | Family Scincidae | | | | | |
| 6 | *Eutropis multifasciata* (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 |

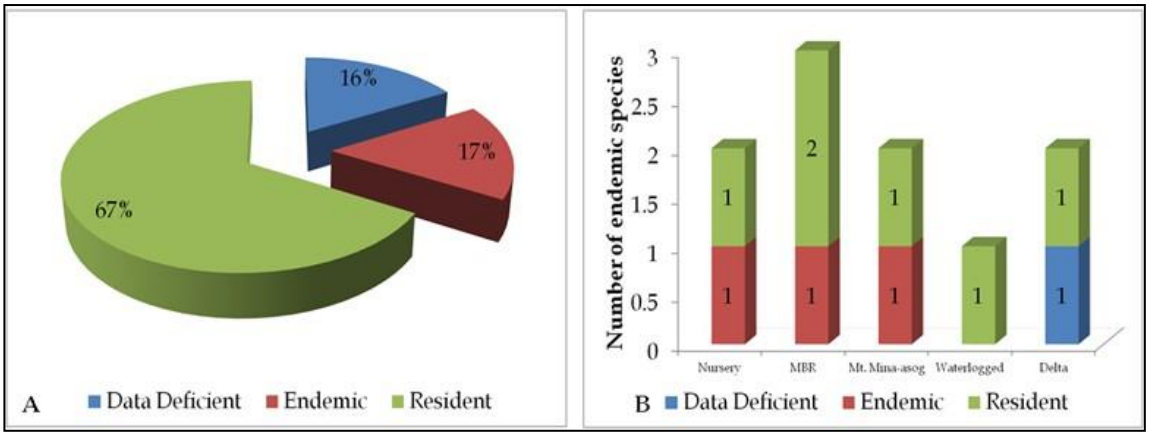
| | | | |
|---|---|---|---|
| Total number of threatened species | 1 | 0 | 1 |

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

*2.1.1.4.3.2.7 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.*



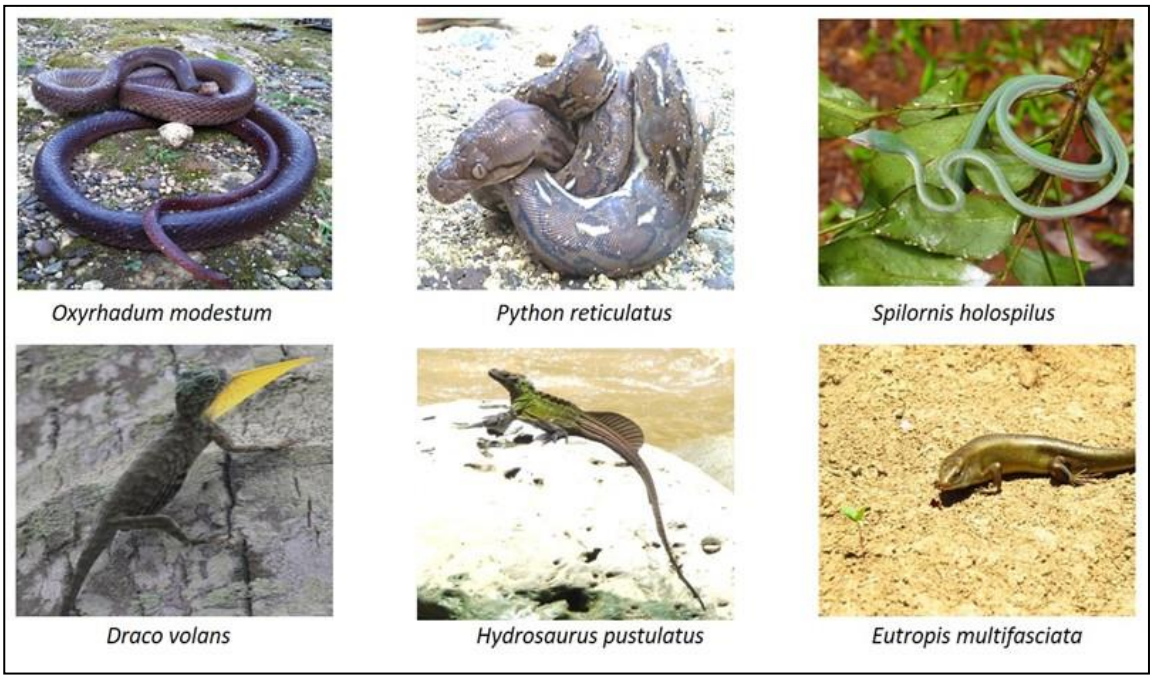




*Photo1-22. Photographs in life of some reptiles that were seen within the M & S IFMA premises.*

*2.1.1.4.3.2.8 Insects*

2.1.1.4.3.2.8.1 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 **Error! No text of specified style in document.**-31. List of Insects/Arthropods and Significance Value in the M & S IFMA area.*

| Order/Family | Common Name | Significance (Economic/ Biological/ Cultural Value) |
|---|---|---|
| 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.

### *2.1.2 Impact Assessment*

2.1.2.1 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 ancentral 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.

2.1.2.2 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.

*2.1.2.2.1 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. To mitigate this, we shall cover backloads with canvass and regular sprinkling of unpaved roads as well as regular conduct of check ups and preventive maintenance to all types of equipment/vehicles.

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.

*2.1.2.2.2 Nursery Management*

Forest nurseries may also be at risk for contamination of ground water if chemicals and pesticides are used. But the company will limit the use and application for chemical and pesticides. If located near surface water bodies, there is a risk of run-off containing chemicals toxic to aquatic animals. To address possible contamination hereof, we shall limit the use of chemical and create water diversion for run-off water prior it drains to possible nearby river to avoid toxicity to aquatic animals. Chemicals will be use and apply for a maximum of 3 months only to planting materials before it will be transplanted to plantation development area. During transplanting activities, we will use existing trail road to access planting site to avoid disturbance to flora and fauna. Plantation maintenance cycle for round weeding and row brushing will be applied to lessen plants morbidity and mortality. Thinning will be conducted at the age of 4$^{th}$ yr and 8$^{th}$ yr to ensure healthy and quality tree growth.

*2.1.2.2.3 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.

In consideration, the company shall conduct thinning activities at the age of 4th yr and 8th yr to ensure healthy and quality tree growth. Through thinning activities, undesirable tree growth will be removed and let the young ones with healthy tree stands to flourish its crown when directly hit with sunlight. Immediate revegetation within six (6) months from clearing activity will be implemented to restore and sustain the soil nutirents using the choice of mixed forest tree species. The company will redevelop the cut area using the planting prescriptions of 2x3 spacing for forest trees plantation species. Existing access roads to production site shall be used to avoid disturbance to existing vegetation, flora and fauna.

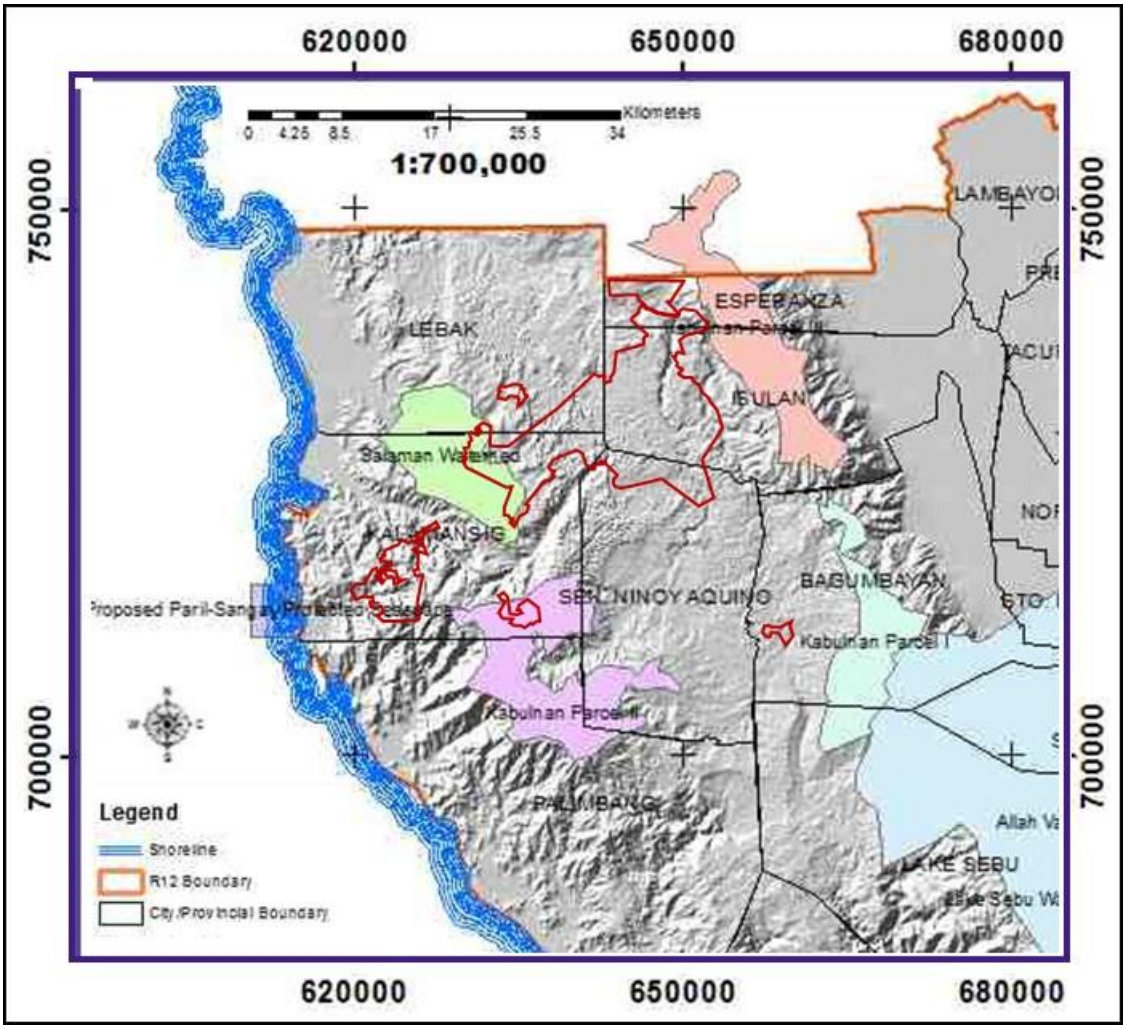
## 2.2 The Water

### *2.2.1 Baseline Environmental Conditions*

2.2.1.1 Hydrology/Hydrogeology

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

*Map 1-18. Watershed Areas*

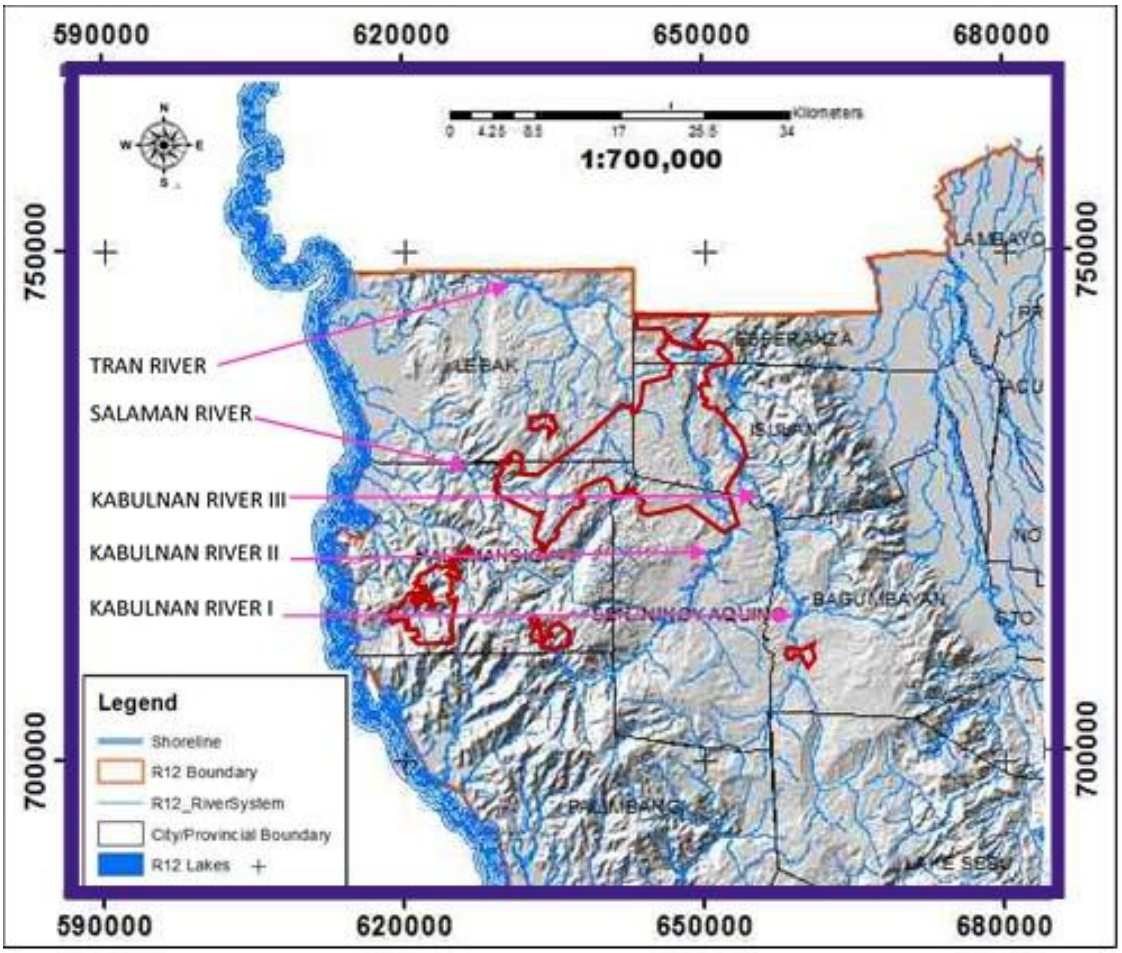



*Source: DENR Region 12 www.r12.denr.gov.ph. Accessed 10/29/18.*

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 **Error! No text of specified style in document.**-19. River Systems*




*Source: DENR Region 12 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.

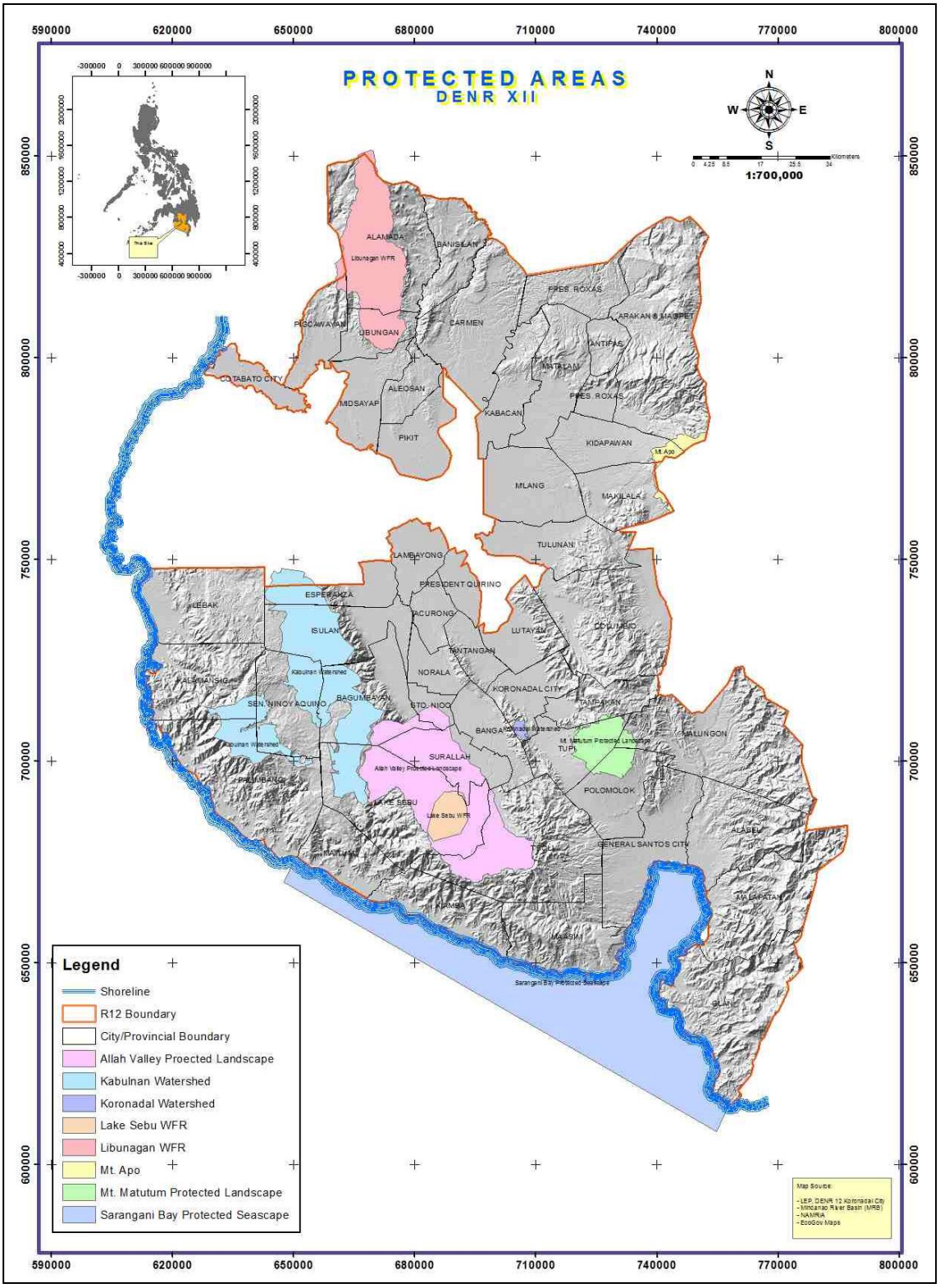
Salaman River originates from the mountains in Kalamansig, winding west-northwest-west through Kalamansig's coastal plains until it empties into the Celebes Sea. Likewise, a few tributaries have some portions running throught eh consolidated IFMA area.

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 Kabaulnan-3. The northern portion passes through the municipalities of Senator Ninoy Aquino (SNA) and Isulan where it then merges with Kabulan-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 1-20. Protected Areas*




*Source: DENR Region 12 www.r12.denr.gov.ph. Accessed 10/29/18.*

2.2.1.2 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 Montioring 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. First sampling conducted in three sampling sites, the upper, mid-stream and lower stream for Ecoli and TSS, since to no avail of other samplings for analysis in DOST Koronadal. The second try for water sampling analysis was conducted but was only able to collect only from Upper and lower stream since at that time of sampling activity and site visit was raining and going to site is quite hard. These three (3) sampling sites per river: upper/upstream, mid stream and lower/downstream were pins as 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 | mg/L | 5 | <1 | 1 | 1 | 1 | <1 | <1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Demand | | | | | | | | |
| 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

### *2.2.2 Impact Assessment*

2.2.2.1 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.

2.2.2.2 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.

## 2.3 The Air

### *2.3.1 Baseline Environmental Conditions*

2.3.1.1 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 1-32. Climatological Normals, Rainfall and Temperature*

| Month | Rainfall (mm) | Temperature (°C) |
|---|---|---|
| January | 88 | 24.8 |
| February | 84 | 24.9 |
| March | 120 | 25.8 |
| April | 147 | 26.7 |
| May | 269 | 27.1 |
| June | 312 | 26.6 |
| July | 325 | 26.1 |
| August | 245 | 26.1 |
| September | 257 | 26.0 |
| October | 286 | 26.0 |
| November | 216 | 25.7 |
| December | 140 | 25.1 |
| ANNUAL | 2,488 | 25.9 |

*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.

2.3.1.2 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 Berkmans 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 $PM_{10}$ was carried out by using a high volume $PM_{10}$ sampler. Ambient air was drawn at a controlled flow rate into a specially-shaped cyclone inlet where the larger particulates are inertially separated from $PM_{10}$ size range. Each size fraction in the $PM_{10}$ 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 $PM_{10}$ collected. The concentration of $PM_{10}$ in ambient air was determined from the ratio of total mass of $PM_{10}$ 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 | • Calm<br>• Smoke rises vertically |
| BF1 | 1 | Light Air | • Direction of wind shown by smoke drift, but not by wind vanes |
| BF2 | 3 | Light Breeze | • Wind felt on exposed skin<br>• Leaves rustle<br>• Wind vanes begin to move |
| BF3 | 4.5 | Gentle Breeze | • Leaves and small twigs constantly moving<br>• Light flags extended |
| BF4 | 7 | Moderate Breeze | • Dust and loose paper raised<br>• Small branches begin to move |

**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 | • State of the sky when it is cloudless, totally clear or with few small light clouds visible.<br>• Has a total cloud cover of less than one okta |
| Partly Cloudy | • State of the sky is within 2-5 oktas total cloud cover or has between 30% to 70% cover of the celestial dome |
| Partly Cloudy to at Times Cloudy | • Mostly partly cloudy but there are times when more than 70% of the celestial dome is covered with clouds. |
| Mostly or Mainly Cloudy | • The sky is mostly covered with clouds but with possible brief periods of sunshine.<br>• The total cloud cover is between is between 6 to 8 oktas. |
| Cloudy | • The sky is covered with clouds between 6 to 8 oktas or has more than 70% cloud cover.<br>• Predominantly more clouds than clear sky.<br>• For a longer period during the day, the sun is obscured by clouds. |
| Overcast | • The sky is totally or completely covered with thick and opaque clouds, 8 oktas or around 100% cloud cover. |

*Source: PAG-ASA*

**Table 4. Rain Description**

| Rain Description | Definition / Description |
|---|---|
| Very Light Rains | • Scattered drops that do not completely wet an exposed surface regardless of duration |
| Light Rains | • The rate of fall is from trace to 2.5 mm per hour.<br>• Individual drops easily identified and |

| | |
|---|---|
| | puddles (small muddy pools) form slowly.<br>• Small streams may flow in gutters. |
| Moderate Rains | • The rate of fall is between 2.5 mm to 7.5 mm per hour<br>• Puddles rapidly forming and down pipes flowing freely. |
| Heavy Rains | • The rate of fall is greater than 7.5 mm per hour<br>• The sky is overcast, there is a continuous precipitation<br>• Falls in sheets, misty spray over hard surfaces.<br>• May cause roaring noise on roofs. |
| Monsoon Rains | • Heavy and continuous precipitation attributed to either the Southwest or Northeast Monsoon. |
| Occasional Rains | • Not frequent but is recurrent precipitation. |
| Widespread Rains | • Precipitation occurring extensively throughout the area |
| Frequent Rains | • Precipitation occurring regularly and often throughout the time duration. |
| Intermittent Rains | • Precipitation which ceases at times and re-occur again |

*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 $PM_{10}$. 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 $PM_{10}$ –all were based on 60 minutes averaging time.

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

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.

### *2.3.2 Impact Assessment*

2.3.2.1 Pre-Operations Phase

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

2.3.2.2 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 $CO_2$ sequestration causing some degree of effect on the microclimate. Planting and reforestation, however, will generate biomass which will help in carbon sequestration.

## 2.4 The People

### *2.4.1 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.

2.4.1.1 Population and demography

*2.4.1.1.1 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 **Error! No text of specified style in document.**-33. 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 1-34. 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*

*2.4.1.1.2 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 1-35. 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 | 168909 | 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 1-36. 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*

*2.4.1.1.3 Land Area and Population Density*

As of 2015, Esperanza was the most densely populated at 186 persons per square kilometer followed by Lebak at158 persons per square kilometer; and Senator Ninon 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 1-37. 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 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 1-38. 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 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**).

*2.4.1.1.4 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 1-21. Settlements Map covering Project Impact Areas*

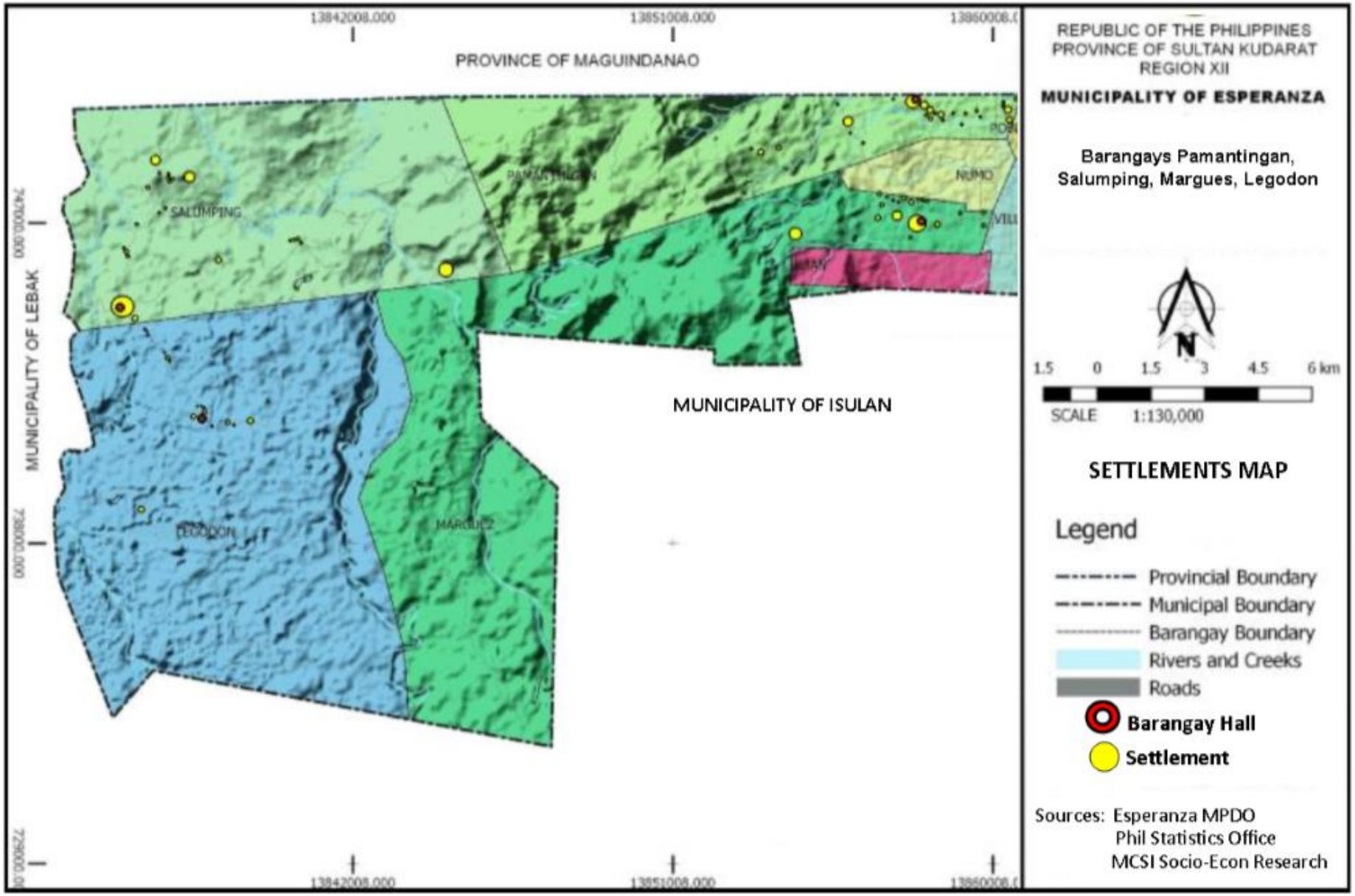
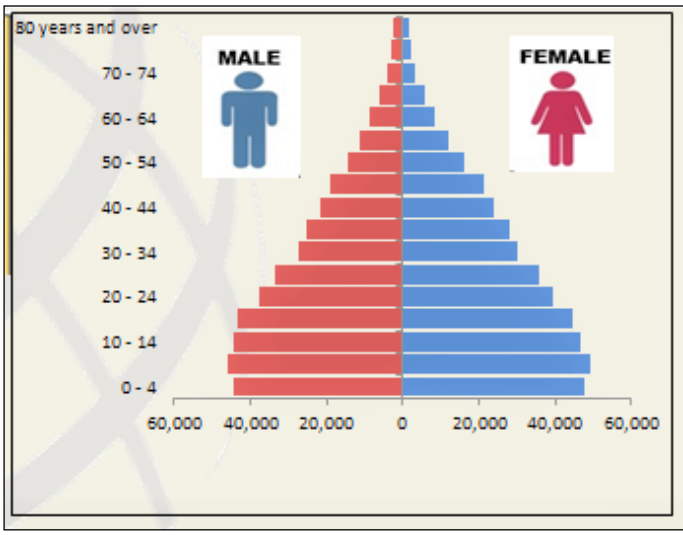


*Figure 1-4. Age-Sex Pyramid, Sultan Kudarat, 2015*




| Age | Male | Female |
|---|---|---|
| 0 - 4 | 47,575 | 44,549 |
| 5 - 9 | 49,515 | 46,235 |
| 10 - 14 | 46,613 | 44,556 |
| 15 - 19 | 44,776 | 43,349 |
| 20 - 24 | 39,251 | 37,764 |
| 25 - 29 | 35,750 | 33,721 |
| 30 - 34 | 30,264 | 27,550 |
| 35 - 39 | 28,242 | 25,476 |
| 40 - 44 | 24,083 | 21,803 |
| 45 - 49 | 21,394 | 19,151 |
| 50 - 54 | 16,188 | 14,649 |
| 55 - 59 | 12,092 | 11,429 |
| 60 - 64 | 8,624 | 8,516 |
| 65 - 69 | 5,776 | 6,245 |
| 70 - 74 | 3,471 | 4,138 |
| 75 - 79 | 2,156 | 2,888 |
| 80 years and over | 1,627 | 2,679 |

*Source: Demographic and Socio-Economic Characteristics of the Population of Sultan Kudarat Province (Based on the Results of POPCEN 2015 Highlights), www.rsso12.psa.gov.ph*

2.4.1.2 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.

*2.4.1.2.1 Barangay Pamantingan*

2.4.1.2.1.1 Socio-Economic Profile

2.4.1.2.1.1.1 Population

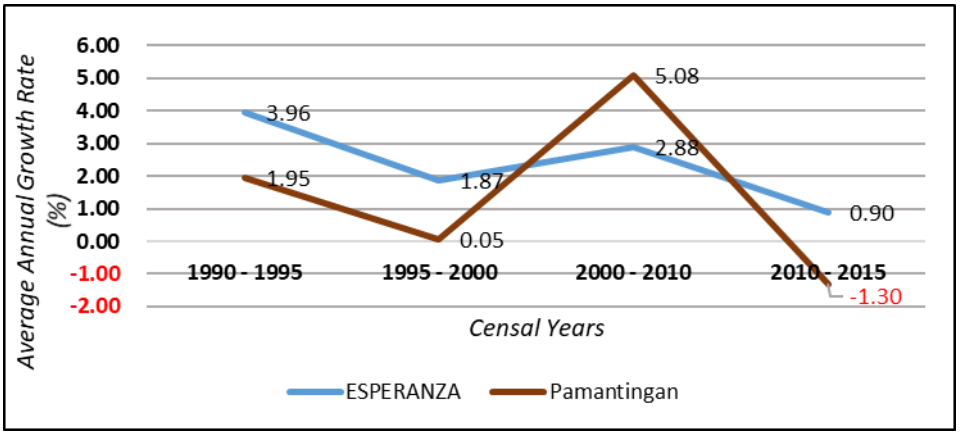
As of 2015, the population of Pamantingan was 3,901, a decrease of 1.3% from the 2010 population of 4,164. (**Table 2-34** and **Figure 2-5**)

*Table 1-39. 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 **Error! No text of specified style in document.**-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.

2.4.1.2.1.1.1.2 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 1-40. 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*

2.4.1.2.1.1.1.3 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 1-41. 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 |
| **TOTAL** | **249** | **100.0** |

*Source: MSCI LSEP, 2018*

### *2.4.2 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 1-42. Distribution of Household Population by Age Group and Sex, and Sex Ratio by Age Group, Pamantingan, 2018*

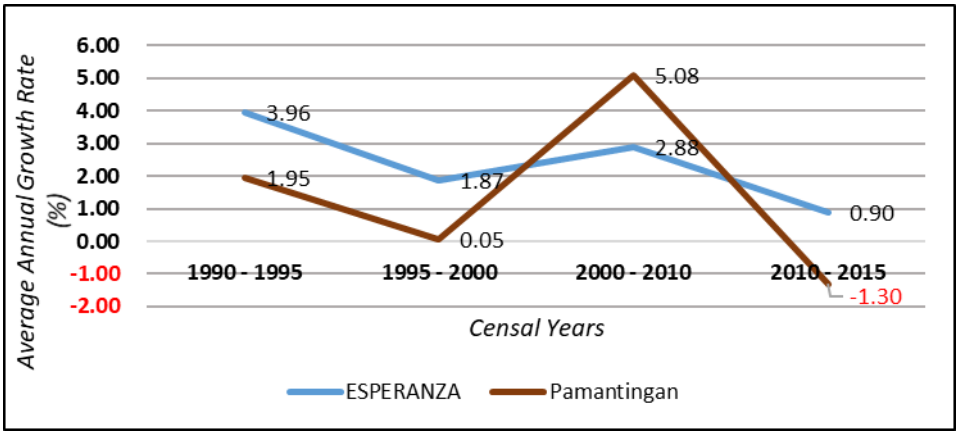
| Age Group | Male | | Female | | Both Sexes | | Sex Ratio |
|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | |
| 0-4 | 52 | 12.1 | 29 | 8.0 | 81 | 10.3 | 179 |
| 5-9 | 40 | 9.3 | 43 | 11.9 | 83 | 10.5 | 93 |
| 10-14 | 53 | 12.4 | 49 | 13.5 | 102 | 12.9 | 108 |
| 15-19 | 35 | 8.2 | 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 |
| **Total** | **428** | **100.0** | **362** | **100.0** | **790** | **100.0** | **118** |

*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*



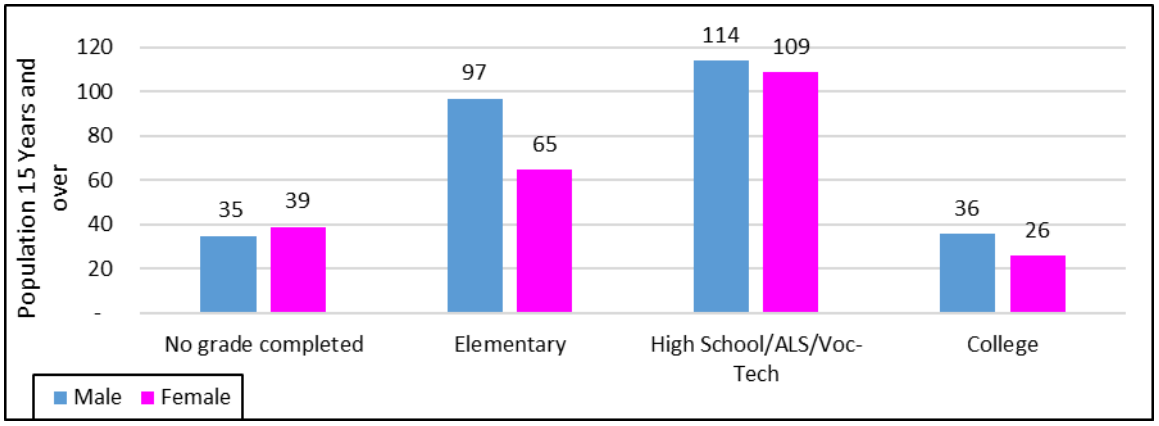

*Source: MSCI LSEP, 2018*

### *2.4.3 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 1-43. 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. | % | 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 |
| **Total** | **626** | **542** | **86.6** | **292** | **53.9** | **250** | **46.1** |

*Source: MSCI LSEP, 2018*

*Table 1-44. 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. | % | 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 |
| **Total** | **626** | **584** | **93.3** | **317** | **54.3** | **267** | **45.7** |

*Source: MSCI LSEP, 2018*

2.4.3.1 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 1-45. 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.

2.4.3.2 Total monthly income and source

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

*Table 1-46. Total Monthly Household Income by Source, Pamantingan, 2018*

| Source of Income | Income | | Households | |
|---|---|---|---|---|
| | Value (Php) | % | Number | % |
| **Total** | **3,013,356** | **100.0** | **245** | **100.0** |
| 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%.

2.4.3.3 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 1-47. 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 |
| **Total Households** | **245** | **14** | **16** | **73** | **73** | **38** | **31** |
| | | | | | | | |
| **Number of Households by Number of Earned Income Sources** | | | | | | | |
| 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 |
| **Average Monthly Earned Income by Number of Sources (Php)** | | | | | | | |
| 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*

2.4.3.4 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**).

*Table1-48. 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*

2.4.3.4.1.1 Availability of public services

*2.4.3.4.1.1.1 Schools*

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

*Table 1-49. 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 |
| | 3. Pamantingan Elem. School | Barangay Pamantingan |
| | 4. Sultan Sinanggayan Elem. School | Barangay Ilian |
| | 5. Plamango Elem. School | Plamango, Pamantingan |
| Primary | 1. Lifi-Lifian Primary School | Lifi-Lifian, Pamantingan |
| | 2. Bongo-Bongo Primary School | Bongo-Bongo, Pamantingan |
| | 3. Abang Primary School | Abang, Pamantingan |
| | 4. Tiger Primary School | Tiger, Pamantingan |
| Pre-School | 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. Bong-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 1-50. 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*

*2.4.3.4.1.1.2 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 (2nd to 5th delivery) are available in the BHS.

*2.4.3.4.1.1.3 Housing*

There are no subdivision projects in the area. And most houses in Pamantingan are constructed through self-finance. The company will support any development of the LGU. in the future, as long as it undergoes legal process with complete documents in converting forest land to residential.

On the other hand, M&S Company provides housing to employees known as bunkhouses or staffhouses. We make sure that all employees coming in shall have their own shelter. This housing provision were also extended to some of qualified Indigenous People families as part of the manage-in-placed of Indigenous Cultural Community where we don't only provide employment, farm-implements, planting materials but we also provide housing provisions to Indigenous Peoples made of wood. The company had allocated about 733 hectares as resettlement areas. Any form of agreement must be made to avoid future conflict with the IPs in the future. Census will also be conducted to settlements within IFMA area to determine the list of IPs originally given relocation site inde the IFMA.

In the event that of force majeure where these people will be displaced due to stoppage of operations, the company will try to save those skilled and competent by transferring them to other areas of operations, whenever deemed necessary. But, mostly, people will go back to their nearby hometown. Few will stay especially those given areas for resettlement. But without the presence of the IFMA project, the area will be most vulnerable for lawless elements attack and lair in the area. It is foreseen that some would resort to planting farm crops but soon leave or vacate the area from one place to another.

*2.4.3.4.1.1.4 Light and water services*

All light and power services in the municipality of Espernza 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.

*2.4.3.4.1.1.5 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.

*2.4.3.4.1.1.6 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.

*2.4.3.4.1.1.7 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. Plamango Day Care Center

4. Ku-ed 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.

*2.4.3.4.1.1.8 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.

### *2.4.4 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.

2.4.4.1 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. IP's will be the priority for hiring.

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.

2.4.4.2 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 known as habal2x.

2.4.4.3 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. The company shall implement regular monitoring of incoming and outgoing vehicles inside the IFMA area. Their movement shall be properly controlled and coordinated, so that local traffic will not be affected. Proper coordination with affected barangay concerned especially the houses along the hauling route to avoid possible risk incident during hauling activities of log cut from log deck to log landing. All warning lights device should be functional to all logging trucks and other transportation vehicles to easily be detected and avoid possible collision and any risk incidents, especially at night.

2.4.4.4 In flux of People

With the presence of IFMA project in the area, it stimulates the influx of people from various area of neighboring communities,thus, population increases. Employees will be provided with bunkhouses while those IP's had been managed in placed and given relocation site within IFMA area. It cannot be avoided that, thru intermarriage, their family and population increases as well. And this requires an additional area for relocation site, which the management will possibly act an appropriate action hereof as deemed necessary. Census on the originally relocated IP's within the IFMA and land/boundary survey will be conducted as basis for proposed land classification, review, and discussion of management and approval of concern agency.

# 3. ENVIRONMENTAL MANAGEMENT PLAN

*Table 1-51. 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 |
|---|---|---|---|---|---|---|
| **Pre-Operations Phase** | | | | | | |
| • *Permitting / Clearances application*<br>• *Survey & mapping*<br>• *Bridges and Road rehab & Maintenance*<br>• *Repair and maintenance of existing support facilities* | **Land* | **conflict to stakeholders*<br>**erosion*<br>**Disturbance to wildlife and damages to existing vegetation from cutting, clearing or removal of weeds, grasses and other types of vegetation during site preparation*<br>**Solid Waste generation*<br>**Access roads, if not controlled, may expose threat for in-migration, conversion to agri, live stock, hunting, mining, illegal fuelwood extraction and/or charcoal production and colonization by invasive plant species*<br>**Dilapidation of bridges and existing unpaved roads Bridges/ spillways*<br>*•11 units of bridges*<br>*•3 units of spillways*<br>*-Logging roads*<br>*•161 kms*<br>*-Main roads*<br>*•143 kms*<br>*-Spur roads*<br>*•18 kms*<br><br>**Dilapidation of existing support facilities and buildings in Camp site*<br>*-Office building*<br>*-Motorpool*<br>*-central nursery*<br>*-commissary*<br>*-warehouse*<br>*-patrol tower*<br>*-communication facilities* | ** Conduct community dialuoges and public participation*<br>**apply and secure permits / clearances to concern agencies prior commencement of project*<br>**Controlled and minimized Clearing and cutting of vegetation to allow sufficient passage way to project site*<br>**Conduct stand inventory, research and planning*<br>** Access roads shall be soley use for management and harvesting purposes*<br>**frequent rehab and maintenance of bridges/spillways and existing roads*<br>**Avoid use of road during heavy rainfall*<br>**Conduct frequent check up and rehabllitate those buildings / structures identified as old / dilapidated* | MSCI, EMB,LGU | 1 million | EMP/EMF |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | *-generator sets*<br>*-Guesthouse*<br>*-Staffhouse*<br>*-Bunkhouse*<br>*-Others* | | | | |
| | Air & noise quality<br>- | **Dust Generation and Noxious Emission*<br><br>*Noise generation* | **Cover backload of hauler trucks with canvass*<br>**Regular sprinkling of water of unpaved roads or exposed soils /grounds*<br>**Removed muds and dirt on trucks wheel.*<br>**Hauler Trucks must slowed down in passing populated areas to minimize dust generation.*<br><br>**Wearing of mask or googles during hauling and cutting activities*<br>**All heavy equipment / noisy construction activities shall be done during day time.*<br>**Implement proper maintenance of equipment and use of muffler for certain equipment.* | | | |
| | Water quality | **Siltation of surface water bodies*<br>*Due to fallen debris or log wastes generated due to cutting near water bodies* | * Installation of silt traps / screening nets as barrier for any fallen debris and avoid accumulation of brash and logwastes and to avoid drainage siltation. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **Siltation of Drainage's or water ways from unconfined stock piles of soil and other materials*<br><br>** soil erosion*<br><br>**Used Oil spillage* | **Sand bags can be used to line the drainage areas. This will help contain silt as well as reduce flow velocity.*<br><br>**Set-up temporary silt traps/pond along waterbodies to prevent siltation*<br><br>**Timber Stand Improvement or revegetation along rivers and creeks to hardened and strengthened its stream bank and avoid soil erosion*<br><br>**Used oil must be stored in spill-proof and leak proof containers to avoid groundwater contamination.*<br><br>**spilled equipment lubricants must be properly segregated and disposed of to avoid accidental dispersal and possible contamination.* | | | |
| | People | *Income generation to local community<br><br>*Increase in local tax collection<br><br>*Vulnerability risk for illegal entry, | **Hiring Priority shall be given to local inhabitant / host communities esp. the IP's*<br>**Continue implement the community development programs esp. to IP's*<br><br>**Regular and on-time payments* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | illegal logging, kaingin making and fire occurrences<br><br>*Traffic | *of forest charges, permits and others*<br>**conduct foot patrol/aerial patrol quarterly or as deemed necessary to detect and deter any illegal activities occurences within IFMA area.*<br>**Ensure road access is well maintained at all times esp during rainy season*<br>** Provide traffic signs and proper scheduling of vehicle movement such as transport materials during off-peak hours.*<br>**Implement traffic management for immediate response and action during fire, accident, explosion and risk / threat occurrences within IFMA premises.*<br>**Controlled movement of incoming and outgoing vehicles.*<br>**Frequently conduct check up / preventive maintenance of all type of vehicles to avoid mechanical failure, thus affecting the road traffic.*<br>**All warning device must be functional at all times to avoid road collision esp at night time.* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Operations Phase** | | | | | | |
| • *Nursery Management*<br>• *Plantation development*<br>• *Felling and Bucking*<br>• *Hauling and Transport* | Land | **pest infestation*<br>**risk for contamination of ground water, when chemicals and pesticides are used*<br>**risk for run-off containing chemical toxic to aquatic animals.*<br>**Disturbance to existing wildlife and vegetation*<br>**Solid Waste Generation*<br>**Oil Spillage* | **Minimized the use of chemicals or pesticides for a period of three months only.*<br>**Organic or bio-organic shall be preferred alternative to correct the nutrients deficiencies,*<br>**conduct round weeding and row brushing of newly transplanted seedlings / saplings every quarter as plantation maintenance for a period of three years*<br>**Maintenance of a stable ecosystem through the preservation of the diverse flora and fauna and the protection, management and development of the natural forest area.*<br>**50% slope and above 1000 elevation will be allocated as protection forest*<br>**Manage the PRF and DRF areas through Assisted Natural Regeneration, Enrichment Planting and supplemental planting or Timber Stand Improvement. *Selective logging system will be implemented for PRF areas once E.O 23 will be lifted.*<br>**Application of appropriate silvicultural practices and introduction of appropriate* | MSCI, EMB,LGU | 5 million | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | *technologies, if deemed necessary*<br>**Use planting distance of 2x3 meters with pre- thinning at the end of 4th year and 8th year to achieve healthy and quality tree growth.*<br>**Right after final harvest, site preparation, replanting and/or coppice tending shall be done.*<br>**Removal of all equipment and temporary structures after final harvest and skidding to avoid disturbance to flora and fauna.*<br>**Immediate revegetation of log-over areas using planting materials of mixed fast growing forest trees species within six months to recover soil nutrients and strengthen its water holding capacity.*<br>**Implement regular waste collection and disposal system at site.*<br>**Implement re-use, reduce and recycle*<br>**Identify temporary waste disposal within the project area for disposal of waste generated.*<br>**Ensure an all-weathered road condition for proper traffic management*<br>**Removed muds and dirt on trucks wheels.* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Hauler Trucks must slow down in passing populated areas to minimize dust generation.*<br>**Wearing of mask or googles during hauling and cutting activities*<br>*<br>**Used Oil will be collected and stored in safe container to avoid spill over.* | | | |
| | Air & Noise Quality | **Dust generation*<br>**Oil Spillage*<br>**Burning of waste, refuse lubricants and used oil*<br>**Noise generation caused by hauling and transport vehicles and logging equipment.* | **Regulated speed of vehicles especially in populated areas.*<br>**Cover backload of hauler trucks with canvass*<br>**regular watering of unpaved roads or exposed soils/grounds*<br>**hauling trucks must have canvass or any materials of same kind to cover backloads to avoid any fallen debris.*<br>.<br>**Heavy equipment and others shall be properly maintained and services to avoid gaseous emissions.*<br>**Implement proper maintenance of equipment and use of muffler for certain equipment.*<br>**No burning of any solid waste in bulk.*<br><br>**No burning of refuse lubricants and used oil.* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **All hauling and cutting equipment must be used only during daytime to avoid noise disturbance.*<br><br>**Use muffler and existing road access / trail to plantation site and production site to avoid disturbance to flora and fauna.* | | | |
| | Water | *water quality degradation<br><br>**siltation of water due to fallen debris or log wastes generated by cutting of trees near water bodies*<br><br>** Water Pollution due to use of chemicals/pesticides/herbicides* | **Prohibit direct disposal of waste to water bodies*<br><br>**install sediments traps at the end of drainage channels*<br><br>**organic fertilizer should be used/applied as possible* | | | |
| | People | **Income generation to local community*<br><br>**Increase in local tax collection*<br><br>**Plantation Protection against manmade and natural disasters*<br><br>**Influx of People* | **Hiring Priority shall be given to local inhabitant / host communities esp. the IP's*<br>**Continue implement the community development programs esp. to IP's*<br>**Regular and on-time payments of forest charges, permits and others*<br>**conduct foot patrol/aerial patrol quarterly or as deemed necessary to detect and deter any illegal activities occurences within IFMA area.* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Ensure road access is well maintained at all times esp during rainy season*<br>**Provide traffic signs and proper scheduling of vehicle movement such hauling activities, transport materials during off-peak hours and etc. with coordination to brgy concerned affected esp. houses along the hauling route.*<br>**Implement traffic management for immediate response and action during fire, accident, explosion and risk / threat occurrences within IFMA premises.*<br>**Controlled movement of incoming and outgoing vehicles.*<br>**Frequently conduct check up / preventive maintenance of all type of vehicles to avoid mechanical failure, thus affecting the road traffic.*<br>**All warning device must be functional at all times to avoid road collision esp at night.*<br>**Installation of Fire Towers in strategic location and standby firefighting crew during summer*<br>**Creation of patrol team that is trained for fire measures all year round.*<br>**Fire lines in place to abate the spread of fire into, out and outside the project.* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Employs and deputized forest guards technically trained to protect and guard the entire forestlands, properties and people living within the IFMA areas.*<br>**Conduct Regular patrol that aims to easily detect fires, reduce, if not eradicate occurrence of possible entry of lawless elements, kaingin making activities and timber poaching.*<br>**Trees burned shall be replaced with the same tree species*<br>**Formulate / implement programs on forest fire prevention and protection with active participation from employees and IP's living inside the IFMA located in the resettlement areas.*<br><br>**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*<br>** To avoid penetration of lawless elements in the area, the management shall require identification to all incoming family's and individual coming in* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | *within the IFMA project (Valid Government ID's, Barangay, Police and NBI Clearances)*<br>**All potential employees shall undergo pre-employment requirements even those of local communities. They must submit and secure PSA Birth / Marriage Certificate, Brgy or Municipal Endorsement, Brgy Clearance, Police Clearance, NBI Clearance and pre-employment Medical Certificate.*<br>**Provide equal opportunity, integrate women empowerment and gender equality during operations phase*<br>**Employs and support Differently-abled person, whenever applicable.* | | | |
| | Noise | **Noise generation due to site preparation / construction activities* | **Schedule all construction, hauling and transport activities during day time.* | | | |
| **Abandonment Phase** | | | | | | |
| | Land | **Generation of solid Waste*<br>**Oil spillage* | **Proper segregation and disposal of waste*<br>**In the event of non-reproposedal, inform DENR / concern offices prior expiry of IFMA agreement / area abandonment*<br>**All standing facilities shall be turnover to LGU or to* | MSCI, DENR | 250,000 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | *Cooperatives*<br>**Ensure that no structure shall be left behind that will affect human safety and water quality.*<br>**All materials shall be removed, and any land that is contaminated with oily/grease and other possible contaminant shall be cleaned/remedied*<br>**Materials that can be recycled, shall be re-use and recycled or sold to junkshops.*<br>**Unusable waste shall be properly disposed of to the municipal waste facility.*<br>**Equipment shall be sold or transferred to other project site*<br>**Large exposed areas shall be planted with fast mixed growing species*<br>**Cleaned up schedule will be coordinated with the municipal concern for proper disposal and monitoring hereof.*<br>**An agreement shall be made and agreed with certain terms and conditions regarding the compensation of the existing developments and establishments in the area.*<br>**Used Oil will be collected and stored in safe container to avoid spill over* | | | |
| | Air | **Dust generation and noxious* | **Regular watering of unpaved* | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | *emission* | *roads until the area will be fully abandoned and turned over to DENR or Cooperatives via LGU*<br>**Remove muds/dirt from trucks*<br>**Regular check up, preventive maintenance and repair of all types of equipment and vehicles* | | | |
| | Water | *No more significant impacts* | **Few people will leave the site, remains only those local inhabitants who resettled in the area, thereby waste will be minimized with no adverse impacts in the environment* | | | |
| | Noise level | **Noise generated due to hauling and transport of equipment and materials* | **Use mufflers to few vehicle unit to minimize noise*<br>**Limit the use of heavy equipment and schedule hauling and transport activities only during day time.*<br>**regular checkup and preventive maintenance of equipment and trucks.* | | | |

# 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. During the Dialouges with the community, issues and concern must be properly listed, evaluated based on the most basic and necessity in the areas concern. The most pressing issues and concern from the grassroot level should be properly addressed and must be followed up whether this issues and concern were properly been addressed/resolved. The programs/projects/activity must correlate and practical based on their actual most basic needs and are very much applicable to meet their concerns and expectations. A community Relation Officer will be installed then to oversee all the existing projects and incoming

projects to strengthen the community awareness and active participation hereof while uplifting their economic well-being.

## 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*

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

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



4.4.1.1 School Building Donation

| Name of School | No. of Rooms | Year Donated | Cost | Location |
|---|---|---|---|---|
| **A. Municipality of Lebak:** | | | | |
| 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. |
| | | | **2,340,872** | |
| **B. Municipality of Kalamansig:** | | | | |
| 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. |
| | | | **15,441,187** | |

| Name of School | No. of Rooms | Year Donated | Cost | Location |
|---|---|---|---|---|
| **C. Municipality of Esperanza:** | | | | |
| 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. |
| | | | **3,175,000** | |
| **D. Municipality of Bagumbayan:** | | | | |
| 1. Tulale Elementary School | 2 | 1994 | 150,000 | Tulale, Bagumbayan, S.K. |
| | 2 | 2004 | 500,000 | Tulale, Bagumbayan, S.K. |
| | | | **650,000** | |
| **E. Municipality of S.N. Aquino:** | | | | |
| 1. Kulaman National High School | 6 | 1989 | 400,000 | S. N. Aquino, S.K. |
| **F. Municipality of South Upi:** | | | | |
| 1. Itaw Elementary School | 2 | 1994 | 150,000 | Timanan, Upi, Maguindanao |
| **G. Municipality of Ampatuan:** | | | | |
| 1. Tubak Elementary School | 2 | 1998 | 200,000 | Ampatuan. Maguindanao |
| | | | **22,357,059** | |

4.4.1.2 Gymnasium Building Donation

| Name of School | Gym | Year Donated | Cost | Location |
|---|---|---|---|---|
| **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 |
|---|---|---|---|---|
| **Municipality of Kalamansig:** | | | | |
| 1. Notre Dame Of Kalamansig | 200 | 1991 | 24,000 | Kalamansig, S.K. |
| 2. Kalamansig National High School | 150 | 1991 | 18,000 | Kalamansig, S.K. |
| | | | **42,000** | |
| **C. Municipality of Esperanza:** | | | | |
| 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. |
| | | | **126,000** | |
| **D. OTHER SCHOOL:** | | | | |
| 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. |
| | | | **150,000** | |

4.4.1.4 Computers

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

4.4.1.5 Budgetary Requirements of M&S Co.,Inc. "Educational Outreach Program" for the IP Pupils School Year 2018-2019

**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 |
| | **1,291,620.00** |

**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 |
| | **207** | | **161,242.95** |

**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 |
| | 65 | | **16,925.00** |

**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 V1 | 22 | 14 | 36 | 33 | 44 | | 3 | 3 | 15 | 170 | 223.43 | 37,983 |
| | **204** | **98** | **169** | **185** | **287** | **25** | **64** | **70** | **115** | **1,217** | | **252,810** |

*Photo 1-23. 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*


*Photo1-24. 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 **Error! No text of specified style in document.**-25. 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 1-26. 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 1-27. 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 1-28. 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 1-52. 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. Forest trees and 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.

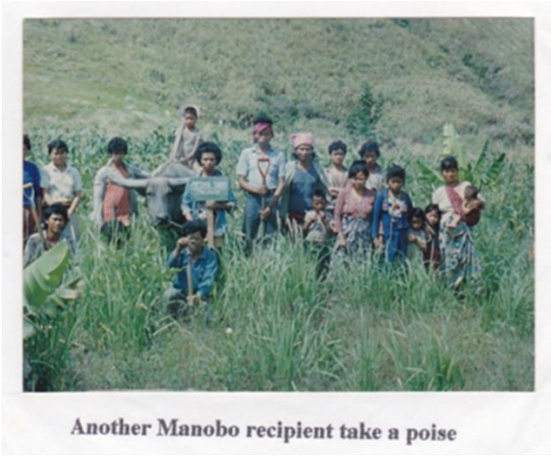
e. *Photo 1-29. NCIP staff with conducted validation process of EDUMATA Association*

KUDUMATA
SEC Certificate

KADUMATA SEC
Certificate

EDUMATA SEC
Certificate


Canson Sayao, One of the Recipients of Carabao Dispersal Program at Sitio Blagkasi, Senator Ninoy Aquino, S.K.




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.

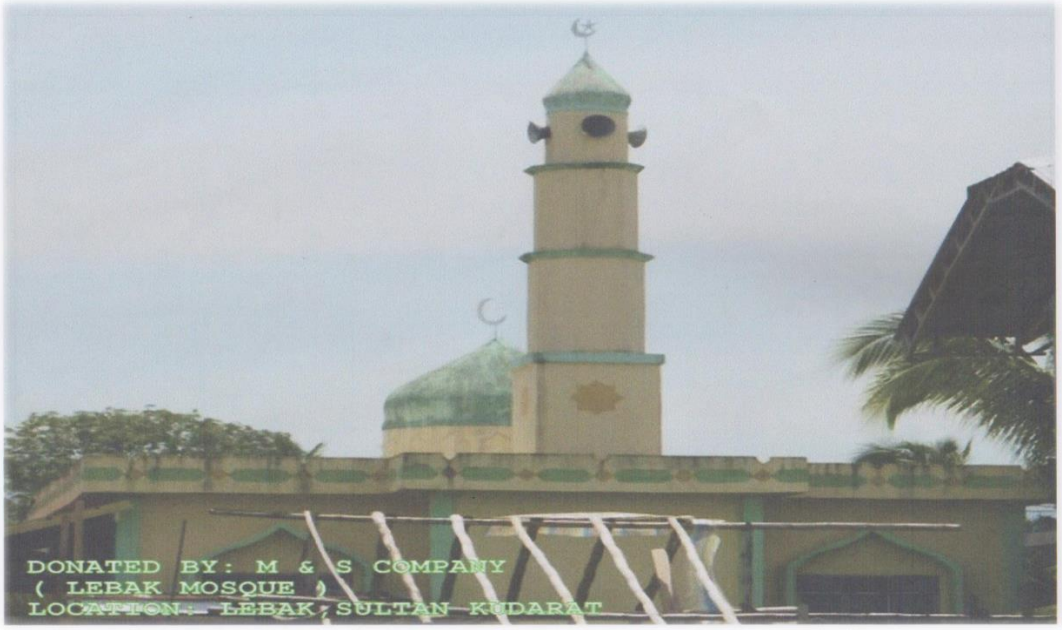


*f. Photo **Error! No text of specified style in document.**-30. Past medical missions*

### *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 **Error! No text of specified style in document.**-31. Roman Catholic Church at Barangay Dukay, Esperanza*




*h. Photo 1-32. 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 1-33. 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 Philipiine 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 egarding 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 reproposeded upon every expiration. The proponent shall immediately inform EMB Central and RO should it fail to reproposed 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 li nfe 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

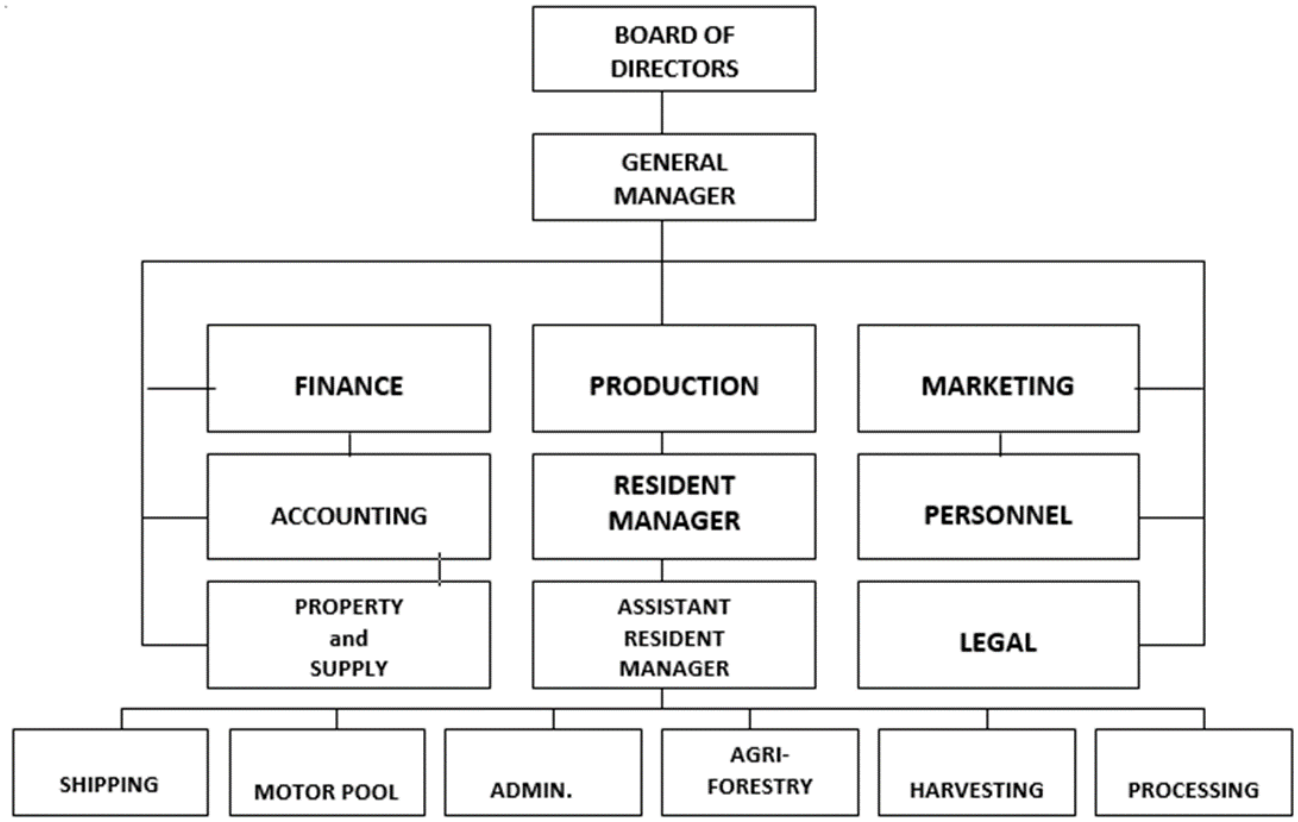
The management shall designate an Environmental Team which shall ensure the implementation of pollution-control related plans and programs. In coordination with the M &S management, the team will be responsible for the formulation of detailed strategy and plans of action that will respond to the requirements 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 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 reproposedal 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.

**M&S Company Organization Structure**



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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** - Vegetative Cover of Integrated IFMA No. 18-2007 (29,085 hectares)

**ANNEX F** - Resettlement Map

**ANNEX G** - Map showing the Support Facilities within IFMA areas

**ANNEX H** - Map showing rivers and Roads within IFMA 18-2007

**ANNEX I** - Map showing existing Patrol Base

**ANNEX J** - Map showing the Direct Impact Areas and Hauling Route

**ANNEX K** - Documentation of Scoping and Participation

**ANNEX L** - Terrestrial Sampling Site Map

**ANNEX M** - Ambient Air and Noise Quality Test

**ANNEX N** - PEMAPS

**ANNEX O** - Copy of Certificate of Compliance issued by NCIP to M&S Co. Inc.

**ANNEX P** - Air Ambient and Water Quality Laboratory Test Result

**ANNEX Q** - Active Faults and Liquifaction Susceptibility Map of Region XII

**ANNEX R** - Copy of Approved CDMP of M&S IFMA No. 18-2007

**ANNEX S** - Maps showing the harvesting operations with hauling route and direct impact barangays

**ANNEX T** - Copy of Approved ECC of Log Pond Area

**ANNEX U** - Copy of Approved Foreshore Lease Area