

INITIAL ENVIRONMENTAL EXAMINATION

of the

PROPOSED 1 MW_p CAGAYAN DE ORO PHOTOVOLTAIC POWER PLANT PROJECT

Prepared for:



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by:

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1.0 INTRODUCTION

1.1 Background

The proponent of this project is Cagayan Electric Power and Light Company Inc. or CEPALCO. To date CEPALCO ranks as the third (behind Cebu City and Davao City utilities) largest electric distribution company in the Philippines, outside of MERALCO. Due to the acquisition of modern facilities and equipment and an efficient and reliable network, CEPALCO holds the distinction of one of the most reliable power distribution company and the lowest power rates in the country and even throughout Asia.

Being aware of the negative impacts to the environment of power generating facilities supplying power to the country, CEPALCO has been vigorously pursuing efforts on the possible integration of clean energy sources into its portfolio of energy supply for its customers. This will not only help promote the city of Cagayan de Oro in its efforts for clean, green and peaceful environs but also it enhances its partnership with local and foreign agencies in the promotion of a clean and green city.

CEPALCO believes that while it cannot yet get away with existing fossil-fueled power plants, actions should be initiated now to mitigate their negative environmental impacts, such as greenhouse gas effect and the depletion of the ozone layer, and take advantage of natural circumstances with regard to climatology and meteorology.

With technical and financial cooperation from the International Finance Corporation (IFC), an implementing agency for the Global Environment Facility (GEF) of the United Nations World Bank, CEPALCO is proposing to develop a 1,000 kW PV plant to be constructed within CEPALCO's service territory.

The PV plant will be used in tandem with the Bubunawan Hydro Plant, another renewable energy project of CEPALCO located in Baungon, Bukidnon, will showcase the technical feasibility of a grid-connected hybrid renewable system, a first in the world and implemented as pilot project in Cagayan de Oro City. While both PV Plant and the Bubunawan Hydro Plant are limited by resource availability, the two plants would be complementary. Additional water flow during the rainy season would offset the poor solar availability. Likewise, enhanced PV output during the dry season would offset the poor hydro availability. *Figures 1 & 2* show the General Location Map, and PV and Hydro Project Sites respectively.

1.2 Objective, Scope and Methodology

This environmental impact study was conducted in accordance with the EIA procedures required by IFC, Presidential Decree 1586 (Philippine

Environmental Impact Statement System) and DENR Department Administrative Order 96-37. This Initial Environmental Examination is aimed at attaining and maintaining a rational and orderly balance between socioeconomic growth and environmental protection by way of identifying and assessing potential environmental impacts and benefits of the project during pre-construction, construction and operational & maintenance phases.

Consistent with the scoping requirements of DENR, two levels of scoping sessions/meetings were conducted for the project: one with EMB and another with representatives of the various stakeholders. The scoping meetings were conducted in March and April 2001.

The Environmental Assessment team conducted primary and secondary data gathering from September 2000 to April 2001. Secondary data were sourced from various government offices and agencies, and other institutions. Published data were supplemented with primary data collection obtained through sampling and field surveys.

The methodologies used include the following:

1.2.1 Project Description

This will provide basic information of project by way of delineating and mapping of project site relative to political jurisdiction (i.e sitio, barangay, etc); describing project's purpose; and describing components, process of operation and phasing (pre-construction, construction and operational).

1.2.2 Environmental Inventory

This study included the present conditions of the delineated primary and secondary impact areas of the project; and secondary & baseline data gathering relevant to land, water, air and socio-economic information on population affected and community/local perceptions of the project.

1.2.3 Impacts Identification and Evaluation

Identification and assessment of impacts was carried out based on the relevant information gathered, by way of applying objective judgment of their magnitude based on qualitative descriptions.

The steps in describing and assessing impacts followed are: Identify potential environmental issues; Briefly describe, evaluate and classify impacts as positive/negative; Assess frequency of occurrence; Assess time scale of impacts (long or short term); Assess reversibility of impacts; and, Assess over-all magnitude of impact (significant, moderate or insignificant).

1.2.4 Proposal for Mitigation and Enhancement Measures

A simplified Environmental Management Plan has been prepared based on the issues and their degree of significance to address significant environmental impacts.

2.0 PROJECT DESCRIPTION

2.1 Location

The proposed project is located approximately 850 km. SSE of Manila with coordinates: longitude 124°-40' E and latitude 8°-26' N. The project will be located at Sitio Lomboy, Barangay Indahag, and is approximately 4.5 kilometers south of Cagayan de Oro City poblacion. The 2-hectare site was purchased from the landowner on a willing seller - willing buyer basis. It is situated at the right side of the road facing north; is about 3.25 km. east of Cagayan River, and is 250 meters above sea level. *Figure 2* shows the general location of the project site.

2.2 Photovoltaic Plant Characteristics

The two hectares of land will be developed and fitted with equipment and accessories. Plant equipment will include some 12,000 PV panels tilted at 5-10 degrees facing south and mounted with 7-mil fixed galvanized steel structures with concrete footings, 0.5 meter above ground, and oriented southwards; 10 Inverters; one Circuit Breaker; and, a Power Transformer.

A 200-sq. meter control building is to be constructed to house control systems, 25 sq-meter conference room, rest rooms, office/reception space, 15 kv cabinets, and a storage room. Also to be constructed are 6-car parking and two-lane road access. The whole property will be enclosed with a reinforced concrete hollow blocks security fence. A 1.5-kilometer, 13.8 kv, 3-phase distribution line will be constructed in order to connect from this project to the last pole of the existing line

2.3 Activities Planned

2.3.1 Civil works planned for PV mounting

A 1.5-meter high reinforced concrete hollow block security fence will be constructed first before any activity is done. Then a few no-value trees and shrubs will be eliminated and disposed of properly prior to site grading. Excavation of steel support foundation, placing of reinforcing bars, and pouring of concrete will follow to complete the foundation works. Next is the assembly of the steel support to be followed by the installation of cable trenches. Laying of crushed pebbles beneath the support structures is next then construction of control building will follow.

2.3.2 Electromechanical Works

Inverters, Circuit Breaker, and a Power Transformer will be installed and wired prior to its inter-connection to PV panels. A 3-phase distribution line shall connect the project to the existing CEPALCO facilities.

2.3.3 Project schedule

Table No. 1- Project Schedule

Item No.	Task	Mo. 1	Mo. 2	Mo. 3	Mo. 4	Mo. 5	Mo. 6	Mo. 7	Mo. 8	Mo. 9	Mo. 10
1	Civil Works										
1.1	Land Development	■	■								
1.2	PV Structure and Foundation			■	■	■	■				
1.3	Control Room				■	■					
1.4	Perimeter Fencing					■	■	■			
1.5	Landscaping					■	■				
2	Electro-mechanical Works										
2.1	Panel Assembly						■	■	■		
2.2	Panel array and wiring						■	■	■		
2.3	Inverter Installation								■	■	
2.4	DC switchgear installation								■	■	
2.5	AC Interconnection								■	■	
2.6	Test and pre-commissioning									■	■
2.7	Commissioning									■	■

2.4 Impact on CEPALCO and its consumers

While PV and Hydro Plants are complementary in nature, the two plants are not physically interconnected via a transmission line. The tandem operation however, is made possible by having their output fed to a common area. The Hydro will store an amount of water equivalent to the generated kwh of the PV and releases this water during peak time.

When electricity demand rises, the local electric utility is duty-bound to find ways to satisfy the demand. Along with the observation that diesel- or coal-fired power plants are the most likely type of power plants that will be constructed in Mindanao, increases in demand in CEPALCO's service territory is assumed to be supplied by diesel generators, i.e., diesel generators are the technology to *beat* by other sources. In other words, a power plant other than diesel will be considered for construction *only* when it is financially equivalent to the diesel power plant. The impact then of the alternative power plant is the same as when the demand is served by the diesel plant.

With a diesel plant, there will be a need to construct transmission lines and distribution substation facilities, which together with the cost of constructing the power plant will amount to a *life-cycle cost* of around

₱71M. The alternative source should therefore beat the ₱71M price tag of the diesel genset for it to be considered.

On the other hand, the PV plant is expected to have a life-cycle cost of ₱225M, around ₱154M more expensive than the diesel power plant. However, since the GEF provides a grant equivalent to ₱154M for this project, the effective investment of CEPALCO will only be ₱71M – equal to the investment required for a diesel generating plant.

In the perspective of CEPALCO's customers, therefore, the impact of rates would be the same whether a PV plant or a diesel plant is constructed (whichever among the two plants is constructed, the same would be CEPALCO's effective investment). Except for the PV panels, balance of system (BOS), transformer, and other related imported items, all other materials are locally sourced out, (cement, form lumber, reinforcing steel bars, etc).

3.0 ENVIRONMENTAL INVENTORY

3.1 Natural Environment

3.1.1 Geographical Characteristics

Cagayan de Oro City, the capital of Misamis Oriental, is located in the northern part of Mindanao, *Annex No. 1*. It has an area of 41,278 hectares, the general relief of which is hilly and mountainous with narrow coastal lowland. In the majority of cases, however, mountains measure less than 1,000 meters above sea level. Many gullies, narrow ravines, and canyons, which may be 150 meters deep, resulting, cut the upland surface to numerous sharp angular hills.

The project area is situated east side of a barangay road, facing south. Barangay Indahag, which is mostly agricultural in land use, has an approximate elevation of 250 masl, *Annex No.2*.

Based on topographic map and visual inspection, the project area is generally flat to nearly level land. Gradient range is from 0 to 3%.

3.1.2 Climatic characteristics

Meteorological data observed at the PAGASA station in Cagayan de Oro City was used in characterizing the meteorological conditions in the project area. These data include temperature, rainfall, relative humidity, prevailing winds, and tropical cyclones.

Cagayan de Oro has a recorded mean annual temperature of 27.2 ° C. The warmest month is May with a mean temperature of 28.3° C while the coldest is January at 26.0° C.

Table No. 2 - Temperature observation (°C) at PAGASA Station in Cagayan de Oro City (1961-95)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
<i>Min</i>	22.0	21.9	22.2	23.0	23.8	23.4	23.0	23.1	23.1	23.0	22.8	22.5
<i>Max</i>	30.7	31.0	31.9	33.0	33.6	32.9	32.7	33.0	32.8	32.5	32.2	31.3
<i>Mean</i>	26.4	26.4	27.1	28.0	28.7	28.2	27.9	28.1	27.9	27.8	27.5	26.9

Rainfall in the area is brought about by the inter-tropical convergence zone, local convective systems (thunderstorm) and to a limited extent, tropical cyclones. Although the climate of the area has no pronounced maximum rainy period, the months of July and September exhibit the highest rainfall averages of 214.0 mm and 216.7 mm respectively. The area has a short, relatively dry period from February to April with monthly mean rainfall less than 100 mm. The average annual total precipitation is 1,618.0 mm.

Table No. 3 - Rainfall observation (mm) at PAGASA Station in Cagayan de Oro City (1961-95)

<i>Month</i>	<i>Rainfall (mm)</i>
January	97.3
February	65.1
March	47.0
April	37.0
May	88.2
June	209.2
July	211.4
August	207.6
September	207.4
October	187.0
November	124.9
December	94.5
Annual	1,576.5

The mean annual humidity is 80%, which is a typical maritime value. The lowest mean monthly value of 76% occurs in April, the driest month, while the highest is 83%, during the months of October and December.

The principal air streams in the area are the Northeast Monsoon (Amihan), the Southwest (Habagat), and the North Pacific Trades.

The North Monsoon prevails during the months of November to March but exhibits maximum intensity during January to February. This air stream originates from the intensely cold anticyclone that develops over the Asiatic continental landmass during the northern hemispheric winter. The Northeast is relatively cold and less humid air stream that reaches the

area from the northeast direction after undergoing significant temperature modification.

The Southwest Monsoon dominates the area during summer, or from June to September. This warm and extremely humid air stream originates from the northern portion of the great Indian Ocean anticyclone during the Southern Hemisphere winter. It crosses the equator and moves in the general direction of the thermally-induced low-pressure area over continental Asia and reaches the Philippines from a southwesterly direction.

The North Pacific Trades are general dominant over the entire country during April and May. These air masses are extremely warm and humid and come to the site from variable directions ranging from northeast to southwest.

While the proposed project route/site is not considered a typhoon prone area, its weather, particularly rainfall, may be affected by typhoons passing close to the northeastern tip of Mindanao during the later part of the tropical cyclone season (November-December). At least one typhoon a year may affect the area's rainfall. The city is not subject to destructive typhoons because it is protected by mountain ranges in the east, which tends to deflect the winds into a more northeasterly direction.

Table No. 4 - Frequency of Tropical Cyclone Passage taken from PAGASA (1948-96)

<i>Tropical Cyclone</i>	<i>Max. Wind near the Center (kph)</i>	<i>Center is over or very close to the area</i>	<i>Center is within 100-km radius of the area</i>
Tropical Depression	40 – 63	1	7
Tropical Storm	64 – 117	1	11
Typhoon	118 and above	-	11

While sunlight duration recorded by PAGASA local station is more than 60% of possible maximum, which is sufficient enough to meet needs of the PV system, rainfall data is also an indicative parameter to determine viability of PV system.

3.1.3 Geomorphological characteristics

City of Cagayan de Oro and its vicinity are underlain by thirteen rock formations. Schist, the oldest known formation, is believed to be part of an old landmass deposited during the Pre-Cretaceous era. These consist of transformed fragment of old sedimentary and volcanic rocks. After the deposition of the fragmented rocks, the landmass emerged from the sea and which geologists prognosticate occurred just before the start of the Cretaceous period. Thereafter, the deposited sediments and volcanic rocks

were subjected to folding, faulting and regional changes in rock structure due to pressure, heat and chemical action resulting to various types of crystalline rocks called schist.

High seismicity, quarternary volcanism and intense recent deformation characterize the Philippine archipelago, as typical of convergent plate boundaries. The city of Cagayan de Oro lies west of a fault zone. One of the major faults found, which is approximately 200 kilometers away from the project area, is an extension of the Philippine Master Fault. It extends on a southeasterly direction from the Dingalon Bay in Northern Luzon passing through the Bondoc Peninsula, Camarines to Masbate, through Leyte, Surigao and ends in Davao Gulf. Philippine Earthquake Frequency Distribution Map and Seismic Activity Map are presented in *Annex No.1 and 1a*.

3.1.4 Hydrological system and Water quality

Studies conducted by the Cagayan de Oro Water District and local waterworks reveal an ample volume of groundwater resources in the Barangay area, as manifested by the presence of box springs, which are their source of water supply. However, the project site, which is located about 200 meters away from existing local water supply, has no source of water. Contractors will be expected to supply their own needs (bathing, sanitary, concrete pouring, etc.) during construction period. Hauling water using a water truck from the source to the project site can do this. Cepalco expects to extend a water pipeline from the source to the site for operational use (cleaning, sanitary, etc.).

Surface freshwater is an abundant resource in Cagayan de Oro City as evidenced by the presence of numerous rivers and creeks. Deep streams and gorges chiseled out by burbling waters drain northward, towards Macajalar Bay in the north. Many streams traverse the lowlands. The major waterways in the city are the Cagayan, Iponan and Cugman Rivers. Swampy patches and stretches of sandy beaches mark the coastal lowlands.

However, the nearest water body, which is the Cagayan River, is found to be 3.25 kilometers due west of the project area and aside from the site being far from Cagayan River, runoff water will drain to the existing dead creek on the northern side of the lot. Thus, there are no expected changes in terms of river pollution due to the installation of the PV plant, *Annex No. 2*.

3.1.5 Edaphic characteristics

Soils in Cagayan de Oro are predominantly clay; other textures range from sand, loam, to clay loam. The following table is based on general productivity ratings of these soils (Bureau of Soils and Department of Agriculture Reg. 10):

Table No. 5 – Soil Class, description and Areas

SOIL CLASS	DESCRIPTION	AREAS
First Class:	<ul style="list-style-type: none"> • San Manuel Loam • Bantog Clay 	<ul style="list-style-type: none"> • Baikingon, Bayabas, Consolacion, Southwestern Kauswagan, Northern Balulang, Eastern Macasandig & Camaman-an • Camaman-an & North Macasandig
Second Class:	<ul style="list-style-type: none"> • Matina Clay • Umingan Clay Loam 	<ul style="list-style-type: none"> • Carmen & Bulua • Gusa, Cugman, Tablon, Agusan & Bugo
Others	(No agricultural Value) <ul style="list-style-type: none"> • Hydrosol • Beach sand • Mountainous & hardly accessible 	<ul style="list-style-type: none"> • Bonbon, Macabalan, Lapasan & North Kauswagan, • North Gusa, Cugman, Tablon, & Agusan • FS Catanico, Tablon & Indahag

3.1.6 Vegetation

3.1.6.1 Methodology

Vegetation surveys were conducted in March 2001. The survey group was assisted by local residents who provided guide services as well as in-situ plant species identification.

The existing vegetation of the proposed project site was described through field surveys. To supplement the primary information

gathered, interviews with key informants and existing information were also used.

3.1.6.2 Current Vegetation

A total of forty-eight (48) plant species in twenty-two (22) families were identified. Most of the plants were common grasses and weeds, characteristic of open grassland. The crop plants included coconuts, bananas and young mangoes. Fruit trees such as santol, guyabano and cashew were found along the borders of the land.

Annex 3 shows the areal extent of the survey.

3.1.6.3 Botanical Catalogue

Attached below is a list of the plants, their scientific and common names, ecological status and uses.

**Table 6 - Plants found in the Site for the Proposed
Photovoltaic Power Plant**

<u>Scientific Name</u>	<u>Common Name</u>	<u>Ecological Status</u>	<u>Use</u>
Family Amaranthaceae			
<i>Amaranthus spinosum L.</i>	Spiny colitis	Occasional	Forage
Family Anacardiaceae			
<i>Anacardium occidentale L.</i>	Cashew	Rare	Edible fruit
<i>Mangifera indica L.</i>	Mango	Cultivated	Edible fruit
Family Anonaceae			
<i>Anona muricata L.</i>	Guyabano	Rare	Edible fruit
Family Apocynaceae			
<i>Tabernamontana pandacaqui Poir</i>	Tuwad	Occasional	Medicinal
Family Compositae			
<i>Bidens pilosa L.</i>	Beggar tick	Occasional	Weed
<i>Chromolaena odorata L.</i>	Hagonoy	Common	Weed
<i>Elephantopus scaber L.</i>	Dila – dila	Occasional	Medicinal
<i>Vernonia cinerea (L.) Less.</i>	Gapas – gapas	Occasional	Medicinal
Family Convolvulaceae			
<i>Ipomoea obscura L.</i>	Mote – mote	Occasional	Weed
Family Dipterocarpaceae			
<i>Shorea negrosensis Foxw.</i>	Mahogany	Rare	Timber
Family Euphorbiaceae			
<i>Euphorbia heterophylla L.</i>	Poinsettia-like	Occasional	Weed
<i>Euphorbia hirta L.</i>	Tawa – tawa	Occasional	Medicinal
<i>Manihot esculenta Crantz.</i>	Kamoteng-kahoy	Cultivated	Food
<i>Phyllanthus urinaria L.</i>	Hantalikod	Occasional	Medicinal
Family Gramineae			
<i>Axonopus compressus (Sw.) Beauv.</i>	Carabao grass	Common	Forage
<i>Cynodon dactylon (L.) Pers.</i>	Grass	Occasional	Forage
<i>Digitaria sp.</i>	Saka – saka	Occasional	Forage
<i>Eragrostis sp.</i>	Grass	Occasional	Forage
<i>Imperata cylindrical (L.) Beauv.</i>	Cogon	Common	Forage
<i>Paspalum conjugatum Berg.</i>	Grass	Occasional	Forage
<i>Pogonatherum paniceum (Lam.) Hack.</i>	Tigbao	Occasional	Weed
<i>Saccharum spontaneum L.</i>	Talahib; bogang	Occasional	Forage
Family Labiatae			
<i>Hyptis suaveolens Poir.</i>	Kadlum – baho	Rare	Medicinal
Family Lauraceae			
<i>Cassytha filiformis L.</i>	Salimpukot	Rare	Weed
Family Leguminosae			
<i>Alysicarpus nummularifolius (L.)</i>	Mani-manihan	Occasional	Forage

<i>D.C.</i>			
Scientific Name	Common Name	Ecological Status	Use
<i>Centrosema pubescens Benth.</i>	Kudzu	Common	Forage
<i>Clitoria sp.</i>	Pukinggan	Common	Weed-vine
<i>Crotalaria incana L.</i>	Dog's tongue	Occasional	Weed
<i>Desmodium sp.</i>	Mani – mani	Occasional	Weed
<i>Gliricidia sepium (Jacq.) Steud.</i>	Madre cacao	Common	Medicinal
<i>Leucaena glauca (L.) Benth.</i>	Ipil – ipil	Common	Forage
<i>Mimosa pudica L.</i>	Sensitive plant	Occasional	Medicinal
<i>Phaseolus lathyroides L.</i>	Mongos – mongos	Occasional	Forage
Family Malvaceae			
<i>Sida acuta Burm.</i>	Escoba	Occasional	Weed
<i>Thespesia lampas (Cav.) Dalz. & Gibs.</i>	Awum	Rare	Firewood
<i>Urena lobata L.</i>	Daupang	Rare	Forage
Family Meliaceae			
<i>Sandoricum koetjape Merr.</i>	Santol	Cultivated	Fruit tree
Family Moraceae			
<i>Artocarpus communis Forst.</i>	Breadfruit; rimas	Rare	Fruit tree
Family Musaceae			
<i>Musa paradisiaca L. var. cinerea Blanco.</i>	Saging latundan	Common	Food
Family Myrtales			
<i>Psidium guajava L.</i>	Guava	Rare	Fruit tree
Family Palmae			
<i>Cocos nucifera L.</i>	Coconut	Cultivated	Fruit tree
Family Polygonaceae			
<i>Antigonon leptopus Hook & Arn.</i>	Cadena – de – amor	Rare	Vine-weed
Family Polypodiaceae			
<i>Nephrolepis sp.</i>	Common fern	Rare	Ornamental
Family Rubiaceae			
<i>Coffea arabica L.</i>	Coffee	Cultivated	Fruit tree
Family Verbenaceae			
<i>Gmelina sp.</i>	Gmelina	Cultivated	Timber
<i>Lantana camara L.</i>	Coronitas; Kanding – kanding	Common	Weed
<i>Stachytarpheta jamaicensis (L.) Vahl.</i>	Kandi-kandilaan	Common	Medicinal

3.1.7 Fauna

3.1.7.1 Current Situation

The wildlife inventories were conducted in conjunction with the vegetation survey in March 2001. Local residents assisted the survey group.

Interviews with local people were also undertaken to verify the presence of wildlife species, particularly rare and endangered ones. In addition, the general conditions of the habitat were characterized.

A total of nine (9) species of birds and twelve (12) species of insects were encountered during the survey. The ecological status of all species is common.

Since the surrounding vegetation is predominantly grassland with very few scattered trees, thus, the wildlife habitat is poor and obviously unfavorable to rare and endangered wildlife species..

3.1.7.2 Changes expected following installation of the plant

It is predicted that the putting up of the PV plant would not significantly disturbed the existing community and reduces the biodiversity within and in neighboring areas.

3.1.7.3 Fauna Catalogue

Attached is a list of the fauna, their scientific and common names, ecological status and uses.

Table 7 - Inventory Of Wild Fauna
(For the 1MW Cagayan de Oro Photovoltaic Power Plant Indahag, Cagayan de Oro)

A. Class Aves: (Birds)

<u>Species</u>	<u>Sighting</u>
<i>Collocalia troglodytes</i> GR Gray Pygmy swiftlet “balinsasayao”	Frequent
<i>Hirundo tahitica abotti</i> (Oberholser) Pacific swallow “balinsasayao”; “langay-langayan”	Frequent
<i>Nectarina sperata sperata</i> (Linnaeus) Red breasted sunbird “tamsi nga pula”	Frequent
<i>Lonchura malacca jagori</i> (martens) Chesnet mannikin “maya”	Frequent
<i>Centropus sp.</i> Coucal “kokok”	Frequent
<i>Megalurus palustris forbesi</i> (Bangs) Striated canegrass warbler “tag-ulula”	Few
<i>Rhipidura sp.</i> Black and white fantail; whistler “baliala”, “bilad-bilad”	Few
<i>Streptopelia bitoquata dusumieri</i> (Temminck) Philippine turtle dove “tukmo”	Occasional
<i>Lanius sp.</i> Shrike	Occasional

B. Insecta

Bumble bee

Honeybee

Centipede

Common cockroaches

Common ants (red and black)

Crickets

Ladybird beetles

Ladybugs

Leaf hoppers

Praying mantis

Spiders

Termites

3.1.8 Landscape

3.1.8.1 Description of landscape surrounding the plant

Except for the frontage, which is a gravel road, the surrounding landscape is open grassland with common grasses and weeds with intermittent crop plants and fruit trees.

3.1.8.2 Visual aspects of the plant

The PV plant will be constructed to follow the natural conditions of the site, such that a more compact but low profile steel structure support system will be used. Moreover, an attractive galvanized steel wide-flange and channel sections for support system will also be used. Overhead lines will only be used when it is economically and visually acceptable to do so; otherwise underground cables will be used to protect areas of scenic value.

3.2 Human Environment

Household Population

There are a total of 21 dwelling units, which are constructed near or around the proposed site of the photovoltaic plant. Permanent residents are found in 18 of these dwelling units only. Those living in the other three units are not permanent residents of the area and were not available at the time the interviews were conducted.

All in all, there are 102 persons who reside near or around the proposed plant. Most households have six members. The average number of members per household is 5.7 members (Figure 1). There are more male members than female.

Number of Members Per Household

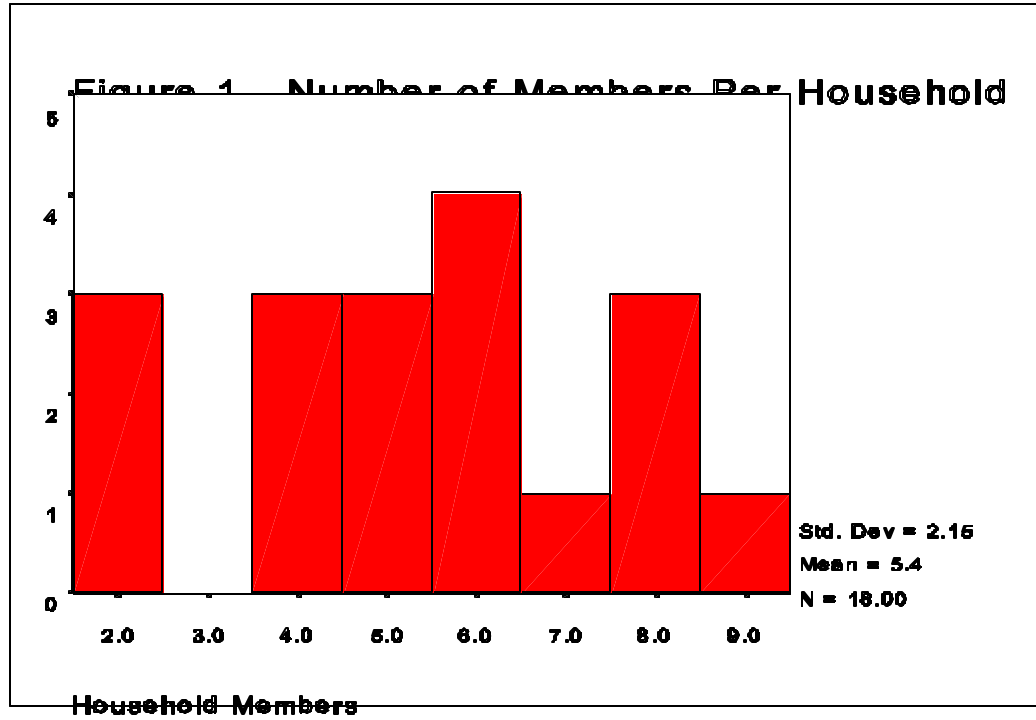


Table 8. - Population Characteristics

	<u>Male</u>	<u>Female</u>	<u>Total</u>
No. of population	55	47	102
Average no. of members/household	3.1	2.6	5.7

The mean age of the male population is 28.1 years and the female 27.0 years. The median age for males is 21 years and for the females, 22 years. Half of the male population is below 21 years of age. The oldest resident is 74 years old and a male.

Table 9- Population Distribution of Residents

<u>Age Group</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
0-4	6	3	9
5-9	5	5	10
10-14	9	4	13
15-19	5	9	14
20-24	5	5	10
25-29	2	4	6
30-34	2	3	5
35-39	4	1	5
40-44	2	3	5
45-49	5	2	7
50-54	3	2	5
55-59	1	3	4
60-64	3	2	5
65 & over	3	1	4
Total	55	47	102

Seventeen of the eighteen households interviewed are headed by a male. The mean age of the household heads is 48.8 years. The youngest is 18 years old and the oldest is 67 years old.

Most household heads are quite educated. The average number of years completed in school by the household heads is 7.89 years. This is equivalent to second_year in high school. Only one of the household heads have never gone to school and the rest have at least finished Grade 5. Three household heads finished a four-year college course.

Most of the household heads are currently married (15 heads), only two are unmarried and one is widowed (the only female household head).

Most of them (14 household heads) profess the Roman Catholic faith. Also, most of them (13) are Cebuano in ethnic origin and the rest are from the province of Bohol.

One-half of the household heads depend on farming for their livelihood. Five works on farms, which they own, and another four works on lands owned by someone else. Some have other sources of income other than farming although all of them also claimed that they also work on the farm for additional income.

There are 16 household heads who are currently married. Some important information regarding their wives was also ascertained. Table 3 shows the distribution.

The wives are younger by about three years than their husbands. The average age of the wives is 45.1 years. The youngest is 19 years old and the oldest is 60 years. On the other hand, the wives have lower

number of years completed in school compared to their husbands. The average number of years in school completed by the wives is 5.75 years and is equivalent to Grade Six. None have finished college.

Ten of the wives are Cebuano in ethnic origin, three are Boholanos, two are Ilonggos and one is a member of a Higaonon tribe. Most of them are also Roman Catholics like their husbands.

Table 10 - Profile of Household Heads and their Spouses

	Household head	Spouse
Average Age	48.8 years	45.1 years
Religion		
Roman Catholic	14	13
Protestant	1	1
Born Again Christian	1	1
Others	1	1
Highest Grade completed in School		
No grade	1	-
Grades 1 - 4	-	6
Grade 5	4	1
Grade 6	4	5
High School 1 - 3	-	2
High School 4	3	1
College 1 -3	1	1
College 4	3	-
Average no. of years completed in school	7.89 years	5.75 years
Civil Status		
Single	1	-
Married	16	16

Widowed	1	-
Ethnic Origin		
Cebuano	13	10
Boholano	4	3
Ilonggo	-	2
Higaonon	-	1
No response	1	-
Usual Occupation		
Retiree	1	
Farmer (allowed to use land for free)	4	
Employee	1	
Driver	1	
Laborer/Construction worker	3	
Insurance agent	1	
Farmer owner	5	
Businessman	1	
Farm caretaker	1	

Place of Birth

Most respondents, including their spouses, were not born in Indahag. Fourteen respondents reported that they are migrants in the area. Three husbands and one wife are reported to be born in Indahag.

Length of Stay in Indahag

Although most respondents are only migrants in the area, most of them have stayed in the area for many years already. One-half of them have stayed for more than 20 years. The longest staying resident has lived in the area for the past 47 years.

Income

Most respondents have very low annual income. The median income of all respondents is P 25,730.00. This means that one-half have incomes below this amount. It also means that one-half of the respondents have incomes of P 2,144.00 per month only. The lowest annual income reported was P 680.00 and the highest was P 300,000.00. There are two respondents whose annual incomes exceeded P 100,000.00. One of them is a building contractor who also breeds fighting cocks, and the other is a farm owner.

Land Ownership

Most respondents own the land that they are working on. The seven other respondents' farmlands owned by someone else. None of these farmers claimed that they are tenants. Most of them (6) are allowed by the owners to use the land for free, and one claimed he is part owner of the land he is working on.

Type of Land Owned and Size of Land

Nine of the eleven landowners own lands devoted to corn and other cash crops like fruit bearing trees, vegetables and root crops. The size of these lands ranges from .5 hectare to 2.3 hectares. One owns a 4.5 hectare coconut plantation.

Four own the residential lots on which their houses are built. The size of these ranges from 4 sq. meters to 200 sq. meters. Some of them also plant vegetables which they sell for cash in their backyard.

The respondents were also asked about the number of years they have been tilling the land which they own or owned by someone else. The number of years reported ranges from less than a year to 27 years. One-half of the respondents have been working on these lands for the past ten years.

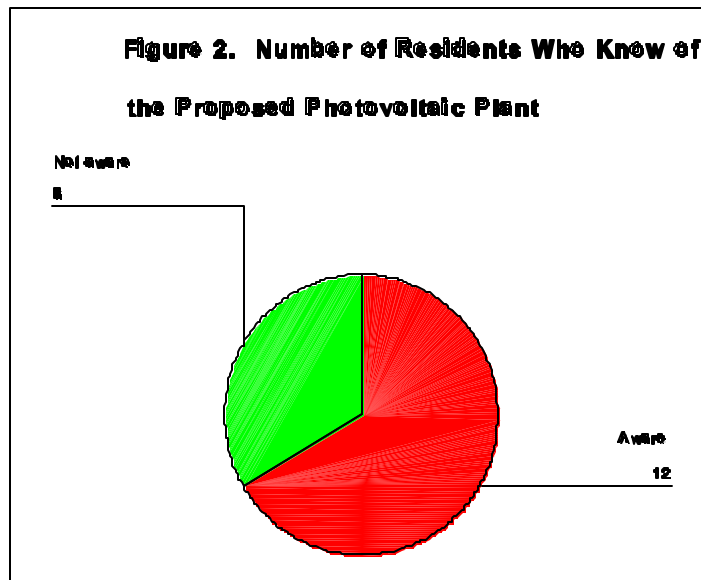
The most common crops planted in the area are coconut, cacao, corn, vegetables, mango, bananas, peanuts, gabi, sweet potato, and cassava.

Awareness of the Proposed Photovoltaic Plant

One of the initial activities that CEPALCO is required to accomplish before they start construction of the plant is to conduct a *scoping* activity in the area. This requirement is part of the environmental impact assessment process. In this activity, residents in the proposed site are informed about the proposed project and its use.

For this purpose, residents living near or around the proposed site of the Photovoltaic plant were invited to attend a session with some representatives from CEPALCO and DENR.

Unfortunately, not all were able to come during the scheduled meeting. Figure 2 shows that majority of the respondents (n=12) are aware of the proposed plan.



The field researchers of RIMCU were also present during the *scoping* activity. They were also briefed about the proposed photovoltaic plant. So, during the conduct of the interviews, they were able to enlighten some respondents and answer some of their simple queries.

Perceived Benefits of the Photovoltaic Plant

The respondents gave varied responses when asked what they think are the benefits they can derive from the project. Most of them also perceive more than one benefit. Table 4 shows that most respondents believe that with the construction of the photovoltaic plant, they will be benefitted with supply of cheap and reliable electric service. Others think

that some residents in the area will have the opportunity to be employed during the construction and that the city will benefit from increased revenues.

Table 11. - Perceived Benefits from the Establishment of the Photovoltaic Plant*

Perceived Benefits	Number
Increase city tax revenue	4
Supply of cheap and reliable electric service to residents	11
Short term employment associated with construction	7
Long term employment associated with maintenance	1
Entry of small and big businesses in the area	4
The place will become lively	2
Don't know/No response	1

* multiple response question

Perceived Positive and Negative Effects of the Photovoltaic Plant

On land. Most respondents think that the construction of the plant in the area will have more positive effects than negative on their land and place. They think that supply of electric power will no longer be a problem in the place. Also, it would increase the value of their land.

Eleven of the respondents think that the plant has no negative effects on their land or place. One respondent is apprehensive that if there is an expansion of the project, his land will be affected and this means giving up some part of his land. Two respondents foresee influx of squatters in the area once this project is pursued.

On plants. Most respondents think that the proposed project will have no positive effects on plants in the area. One said that the price of goods produced in the area will increase and another respondent said he could not imagine a positive effect yet.

There are two negative effects of the project on plants mentioned by the respondents: some plants will have to be cut off and the pollution caused by the project might affect fruit-bearing plants in the place. Most of the respondents believe that the project will not cause any negative effect on plants.

On health of the family. Three respondents perceive that the project will help them maintain clean surroundings and therefore avoid getting sick. They also reported that they will have no more problem with supply of water.

Most respondents believe that the project will have no negative effects on their health. Only three respondents think that the project will cause some noise and pollution, which are detrimental to one's health.

Table 12 -. Perceived Positive and Negative Effects of the Photovoltaic Plant

Positive Effects	Number	Negative Effects	Number
On land/place:			
We will have supply of power.	8	Size of land owned could be affected if there is an expansion.	1
Value of our land will increase.	6	There will be more squatters in the area.	2
There will be less cases of robbery in the area	2	Don't know	1
Some of us can be employed.	1	None	11
Our place will be lively	1		
There will be more businesses and industries that will be opened.	1		
Don't know	2		
On plants:			
Can't imagine a positive effect yet.	1	Some plants will have to be cut.	1
Price of products will increase	1	The pollution it will cause might affect fruit-bearing plants.	1
None	9	None	11
Don't know	2		
On health of family:			
Will have no more problem with supply of water	2	Noise and air pollution will affect our health.	3
Clean surroundings so can avoid getting sick	3	None	11
None	5		

3.2.1 Evolution of Human Exploitation of the area

Based on the survey conducted, the area has been scarcely populated considering that only half of the respondents (about 51) have stayed in the area for more than 20 years. The study shows that the project area has a degraded and simple ecosystem largely dominated by a few grassland species. Thus, soil type of the area is considered not suitable for major agriculture considering that the present median income of all respondents is P25, 730 or about P2, 144.00 monthly only.

3.2.2 Socio-Economic Environment

- Current Situation / Ownership and Use

While there are no houses found inside the 2-hectare project site, there are about 21 dwelling units constructed near or around the proposed site or an equivalent of about 102 persons who reside near the site. The nearest dwelling unit is approximately 75 meters away from the PV site.

Most of the respondents have stayed in the area for many years already, half of which stayed for more than 20 years. Most respondents own the land that they are working on. Nine of eleven landowners own lands devoted to corn and other cash crops. The number of years that respondents have been tilling the land near the site ranges from less than a year to 27 years. The most common crops planted in the area are coconut, cacao, corn, vegetables, mango, bananas, peanuts, gabi, sweet potato, and cassava. Most respondents have very low annual income. The median income of all respondents is P25, 730.

- Changes expected after installation of plant

Access roads

Right now there is an existing trail which passes along the right side of the project site and traverses at the back of the property. This trail will be converted into a 6-meter wide access road to cater to the project and the residents located at the back of the project site.

Land Use

According to the City Planning Officer, Engr. Abejuela, the barangay of Indahag is now being considered to be a development area, thus, it is no longer zoned as 'agricultural'.

Land Acquisition / Compensation

CEPALCO and the landowner, Mr. Florian Labiano had already agreed to a conditional sale of the 2-hectare lot in favor of CEPALCO. The agreed amount is P350.00 per square meter or a total of P7, 000,000.00.

Right-of-way issues for connection to the distribution network

Aside from a few tree trimmings, there are no major right-of-way issues to consider since the proposed 13.8 kv distribution line will only be following the existing barangay road from the substation to the last primary pole of the existing CEPALCO facilities.

4. IDENTIFICATION AND EVALUATION OF EXPECTED ALTERATIONS

4.1 Environmental Impact Identification

The impacts that are associated with the various components of the 1MWp Photovoltaic Project are summarized below for the three (3) project phases, namely: construction, operation/maintenance and abandonment.

The matrix presents the predicted impacts of the various project components. The majority of the impacts are reversible and can be controlled by proven and workable mitigation strategies. Mitigating measures are available to limit the adverse impacts of activities associated with the different phases of the project, and in some cases offer environmental benefits when compared to existing conditions. The impacts that are anticipated for each environmental parameter was rated by the EIA study team in three (3) levels: Insignificant, Moderate and Significant, as well as Negative or Positive. Though the impact ratings are somewhat subjective, they do provide a qualitative assessment and a relative comparison of the impacts of the different stages of the project. Detailed impact assessments and their corresponding mitigation strategies are discussed in the succeeding sections.

Table 13 - Summary Matrix of Predicted Environmental Issues/Impacts

Environmental Issues/Impacts	Level of Significance			
	Significant	Moderate	Insignificant	Type
1. CONSTRUCTION PHASE				
1.1 <i>Physical Environment</i>				
• Soil erosion			▶	(-)
• Dust pollution			▶	(-)
• Noise pollution			▶	(-)
• Solid waste/Wastewater pollution		▶		(-)
1.2 <i>SocioEconomic Environment</i>				
• Safety hazard to workers/residents		▶		(-)
• Hazard to workers' health and sanitation			▶	(-)

2. OPERATION/MAINT PHASE				
2.1 <i>Physical Environment</i>				
• Aesthetic problem			▶	(-)
• Noise from transformer			▶	(-)
2.2 <i>Biological Environment</i>				
• Hazard to transformer oil			▶	(-)
• Hazard to electromagnetic field radiation			▶	(-)
3. ABANDONMENT PHASE				
• End-of-operations provision			▶	

4.2 Environmental Impact Assessment

CONSTRUCTION PHASE IMPACTS

As described in the Matrix of Predicted Environmental Issues/Impacts, the potential environmental impacts of a PV Plant project during construction phase are the six (6) major aspects namely: soil erosion, dust, noise, safety, health & sanitation.

4.2.1 Soil erosion

The construction of the 1MW Photovoltaic Project will involve earthmoving and site preparation covering two (2) hectares. While these activities may not change the already almost flat relief and gradient, however, it will expose the soil to adverse weather conditions, which could erode during periods of heavy precipitation and increased flows. This could induce *sedimentation and siltation* to the nearest stream or river.

4.2.2 Dust Pollution

During the construction stage of the various structures and ancillary facilities, it is anticipated that there will be *dust generation and emissions* from construction equipment. These could increase the incidence of upper respiratory tract infection (URTI) in the vicinity of the project area. This impact is however, considered minimal since construction site is not close to populated areas

4.2.3 Noise Pollution

During the construction period, *noise* level is expected to increase due to motorized construction equipment, the various construction activities and the noise generated by vehicular movement and the construction workers. However, the increase in noise level will only be temporary during the construction phase and is not expected to cause prolonged adverse impacts to local residents.

Noise is a pollution problem that affects human health and well being and that can contribute to a general deterioration of environmental quality. It can affect people at home, in their community, or at their place of work. Prolonged exposure to a high level of noise can have impacts ranging from temporary public or personal nuisance to permanent hearing loss in individuals.

4.2.4 Solid waste/Wastewater Pollution

During construction stage, there is a possibility of increase generation and indiscriminate disposal of *solid wastes, spillage and washings of oil and grease*, which may find their way into water bodies and can cause an increase in the organic load.

4.2.5 Workers/residents' Safety Hazard

Foundation excavations and erection of support structures and stringing of wires may pose potential *physical safety hazards* to construction workers and to the local population during construction if not properly addressed to. Past experiences showed that this negative impact could be significant if not eliminated by effecting appropriate safety precautions to safeguard workers and protect the welfare of commuters and residents along the project.

4.2.6 Workers' Health Hazard

Some 40 workers will probably be required at the peak of construction and it is likely that all skilled labor force will come from other areas. Contractors will provide temporary facilities for workers. If not properly mitigated, makeshift dwelling units, with poor sanitation practices and inadequate sanitary facilities, pose *health problems* to construction workers. The accumulation of domestic and fecal wastes may likewise occur at construction site, which could contribute, to pollution of nearby streams and rivers. Consequently, the incidence of gastro-enteritis and other water-borne diseases may increase if proper sanitation facilities and clean water supply are not adequately provided to the workers.

OPERATION AND MAINTENANCE PHASE IMPACTS

There are five potential environmental issues in the operation and maintenance phase, namely: aesthetic problem, noise from power transformer, transformer oil hazards, and hazard to electromagnetic field radiation.

4.2.7 Aesthetic Pollution

For so long, the *aesthetic* impact of overhead equipment structural support and substation structures, as well as the 13.8 kv distribution line have been criticized due to perceived insult to an attractive countryside view.

4.2.8 Transformer/switchgear Noise Pollution

One potential source of long-term *noise pollution* during operations phase is when there is a need to construct a substation within or near the residential area in order to step-up generated voltage to distribution voltage level. Although power transformers are considered as static apparatus, vibrate and radiate audible sound energy, which can cause psychological and emotional stress, irritability, blood pressure rise, headaches, fatigue, ulcers, and inability to sleep.

4.2.9 Transformer Oil Hazard

Substations using power transformer oil with *polychlorinated biphenyl (PCB)* type can be hazardous to workers during transport, storage, use and disposal, since PCB's are highly toxic chemical material.

4.2.10 Electromagnetic Fields Radiation

Over the years, various studies have allegedly linked *electromagnetic fields (EMF)* to cancer. It was reported that electric fields associated with a transmission line can produce a charge on animals or human beings, within the range of its influence, and human exposure to stationary or low frequency electric fields has harmful biological effect.

4.2.11 End-of-Operation Provision

Should abandonment is inevitable, existing structures can lead to *physical or biological hazards* to nearby residents if not properly planned.

5.0 Protective and Corrective Measures

5.1 Soil Erosion

The site preparation will only be adverse if the following mitigating measures are not implemented:

- Earthworks will be limited to locations of facilities and only when required by construction,
- Cut and fill slopes of directly affected area will be terraced as necessary and stabilized or protected by reasonable grading and proper drainage,
- Optimum priority will be directed towards the utilization of spoils particularly for filling depressions and foundation backfill.
- Any excess spoils will be hauled to designated and properly constructed spoils dumpsite provided with suitable drainage.
- Construction of CHB substation fence shall be made prior to other activities, to contain top soil erosion;

5.2 Dust Pollution

In order to minimize dust generation and construction equipment emissions, the following shall be implemented:

- Dust suppression measures will be implemented and maintained during the entire construction period. Graded area and haul roads will be maintained and watered regularly,
- Maintenance and construction equipment and vehicles will be affected to reduce gaseous emissions (i.e. CO₂, NO₂,etc)

5.3 Noise Pollution

Because the nearest receptor is about 75 meters and considered quite far from the vicinity of the project area, noise levels were no longer measured. However, for purposes of comparison between standards and equipment noise, presented below is DENR-EMB's Noise Standard.

Table 14 - DENR-EMB's Noise Standard

Time of Day	Noise Level, dBA
Daytime	55
Nighttime	45
Evening/Morning	50

Potential sources of noise in the project area may include animal sounds, human conversation, and movement of vehicles or construction equipment. Below is a table of Sound Level Range from various Construction Equipment.

Table 15 - Range of Sound Levels from Various Types of Construction Equipment

		Noise Level (dBA) at 15 m.					
		60	70	80	90	100	110
Earth Moving	Compactors (Rollers)		■				
	Front Loaders		■■■■■				
	Backhoes		■■■■■■■■■■				
	Tractors		■■■■■■■■■■				
	Scrapers, Graders		■■■■■■■■				
	Pavers			■			
	Trucks		■■■■■■■■				
Handling Materials	Concrete Mixers		■■■■■■■■				
	Concrete Pumps			■			
	Cranes (Movable)		■■■■■■■■				
	Cranes (Derrick)				■		
Stationary	Pumps		■				
	Generators		■■■■■■■■				
	Compressors		■■■■■■■■				
Impact Eqpt.	Pneumatic Wrenches			■■■■			
	Jackhammers/Rock Drills			■■■■■■■■■■			
	Impact Pile Drivers (Peaks)				■■■■■■		
Others	Vibrators		■■■■■■■■				
	Saws		■■■■■■■■				

Experience dictates that due to considerable distance from the noise source (project site) to the nearest receptor (approx. 75 meters), it is projected that the arithmetic medians of noise levels generated from construction equipment will not exceed the standard set by DENR-EMB.

However, should any equipment exceed the standards, the following mitigating measures shall be implemented:

- All works that produces much noise are scheduled during the day only in order not to disturb residents during nighttime.
- Maintenance of construction equipment will be given priority to minimize noise generation.

5.4 Solid waste/Wastewater Pollution

To minimize the possibility of increased indiscriminate dumping of solid waste and wastewater in the area, the following is recommended:

- Solid wastes (i.e. paper, empty sacks, scraps of tin or wood, domestic garbage, etc) will be properly classified for recycling or collected and/or hauled to designated disposal areas,
- Temporary motorpool will be provided with drainage canals around their perimeter to intercept run-off laden with oil spills,
- Construction camps will be provided with adequately designed and maintained sanitation systems such as lavatories, showers, urinals and toilets,
- Good housekeeping and construction practices will be promoted.

5.5 Workers/residents' Safety Hazard

Excavations and erection of support structures may not pose physical hazards to workers and to local residents during construction since the following appropriate occupational safety precautions to safeguard the same will be strictly implemented.

- The Contractor will conduct an induction, or a series of lectures or continuing program for safety awareness,
- First-aid facilities will be made readily available to all construction workers,
- Appropriate warning signs and notices will be posted in areas that pose safety concerns.

5.6 Workers' Health Hazard

In order to minimize potential health and sanitation hazard during construction, the following shall be implemented:

- Maximize in hiring local laborers to avoid construction of temporary living quarters which may not have sufficient sanitary facilities; and,
- Out-of town workers shall rent only existing houses with sanitary facilities. This negative impact is only during construction and will have an insignificant effect.

5.7 Aesthetic Pollution

Due to practical reasons, all PV structural support systems, as well as substations, are all designed overhead or above ground. Few people view this as pollution, however, this can be minimized by:

- Design of project structures will consider the natural conditions of the site, such that a more compact but low profile steel structure support system will be used,
- Using a more attractive galvanized wide-flange steel as columns and neat-looking galvanized channel steel sections for structural beams.
- Use overhead lines when it is economical and visually acceptable to do so, and use only underground cables as much as in the areas of scenic values,
- Enclosing the project area with CHB fence and painted, to improve visual impact. Thus, this impact is insignificant.

5.8 Transformer/switchgear Noise Pollution

To mitigate the effect, either or combination of the following shall be implemented:

- Whenever possible, a substation shall be located as far away as possible from residential areas. Since sound generally travels along a line of sight, the substation will not be located in a low spot or in a section surrounded by residential buildings. Preferably, the substation site should be the

largest available. This allows the greatest natural attenuation of sound over the distance from the transformer to the point of sound interest;

- Low-noise transformer is to be used and constructed in such a way as to minimize noise levels. Transformers are available with noise levels that are lower than the National Electrical Manufacturer Association's standard. However, they are non-standard and considerably larger and expensive; and,
- Steel or brick enclosures, baffled ventilators and intervening noise barriers are to be built in order to reduce the noise to the lowest practicable level. If sound reduction is required over a large area, it can generally be obtained by partially enclosing the transformer. A wall that is properly designed and placed can usually furnish ample sound reduction.

5.9 Transformer Oil Hazard

In order to prevent transformer oil hazard, the following is recommended:

- PV project's power transformer will not be using oil with PolyChlorinated Biphenyls (PCB) type. Instead, it will use pure Distillate Mineral Oil. Based on available toxicological information, this type of oil (mineral oil) produces no adverse effects on health (Mobilect 35). Thus, this long-termed impact is insignificant.

5.10 Electromagnetic Fields Radiation

Power lines, home electrical wiring, and electrical equipment produce electric and magnetic fields (EMFs). EMFs are invisible lines of force that surround any electrical device and are produced by voltage and increase in strength as the voltage increases. Even though both electric and magnetic fields are present around electrical equipment and power lines, most recent research has focused on potential health effects of magnetic fields.

Despite growing concern, there is no conclusive medical evidence to date to suggest a causal relationship between proximity to overhead lines and adverse effects on health.

However, aside from all the above facts, placement of electrical equipment and distribution line route right-of-way selected was such that it avoided areas with human activity, and standard electrical clearances are to be maintained all throughout the line and at PV support/substation structures, thus, this impact has an insignificant effect.

5.11 Plant Lifetime and End-of-Operations Provisions

There are no termination or abandonment plans for the project. The power plant will be utilized as long as possible for an undetermined duration, unless nature affects its abandonment.

Should abandonment become inevitable and management relinquishes the operation of the power plant, it can be taken over by interested parties or sold for more profitable and better land options. However, it is expected that whoever would take over, will either upgrade, sell or recycle whatever existing facilities are still usable and available. In this way, no waste disposal is required during abandonment.

During abandonment, man-made structures will be removed or re-engineered to suit other purposes. Excavations will be carefully filled up and revegetated.

5.12 Environmental Action Plan

CEPALCO is committed to implement an Environmental Action Plan (EAP) for the PV project. The EAP outlined below is directed towards achieving a series of environmental targets and objectives and maintaining compliance with IFC and government regulations.

able 16 - ENVIRONMENTAL ACTION PLAN

Parameter	<u>Impact Description</u>	<u>Mitigation Strategies</u>	<u>Schedule</u>	<u>Cost</u>
a) Pre/Construction Phase <ul style="list-style-type: none"> • SOILS 	<ul style="list-style-type: none"> • Soil Erosion 	<ul style="list-style-type: none"> • Earthwork will be limited to location of facilities and if required. • Cut & fill slopes of affected area will be terraced & stabilized. • Utilization of spoils for filing & backfill. • Excess spoils will be hauled to dumpsite. • Construction of CHB fence shall be priority over other activities 	<ul style="list-style-type: none"> • Site preparation 	<ul style="list-style-type: none"> • Included in the civil works

Parameter	<u>Impact Description</u>	<u>Mitigation Strategies</u>	<u>Schedule</u>	<u>Cost</u>
• AIR QUALITY / NOISE	• Dust Pollution	• Dust suppression measures to be implemented.	• Site preparation	• Included in the civil works
	• Equipment gaseous emission	• Maintenance of construction equipment.	• Site preparation	• Included in the civil works
	• Noise pollution	• Scheduling noise-producing works during daytime only. • Maintenance of construction equipment.	• Site preparation	• Included in the civil works
• SAFETY AND SANITATION HAZARD	• Safety Hazard	• Conduct of safety awareness lectures. • Appropriate warning signs & notices be posted in areas of concerns. • First-aid facilities to be made available to all workers.	• Whole project construction duration	• Included in all works

Parameter	<u>Impact Description</u>	<u>Mitigation Strategies</u>	<u>Schedule</u>	<u>Cost</u>
	<ul style="list-style-type: none"> • Health Hazard 	<ul style="list-style-type: none"> • Maximize hiring of local laborers. • Migrant workers to rent houses with sanitary facilities. 	<ul style="list-style-type: none"> • Whole project construction duration 	<ul style="list-style-type: none"> • Included in all works
<ul style="list-style-type: none"> • SOLID WASTE / WASTEWATER 	<ul style="list-style-type: none"> • Solid waste / Wastewater Pollution 	<ul style="list-style-type: none"> • Proper classification of solid waste for recycling, collection or hauling. • Motorpool to be provided with canals to intercept run-off oil spills & grease. • Construction camps will be provided with sanitation systems. • Good housekeeping & construction practices be promoted. 	<ul style="list-style-type: none"> • Whole project construction duration 	<ul style="list-style-type: none"> • Included in all works

<u>b) Operations / Maintenance Phase</u>				
<ul style="list-style-type: none"> • AESTHETICS 	<ul style="list-style-type: none"> • Aesthetic Pollution 	<ul style="list-style-type: none"> • Design structures to consider natural conditions (i.e. compact, low profile) • Use of attractive WF & Channel sections galvanized steel structures. • Use of overhead lines when acceptable and underground cables in scenic areas. • Enclose project area with CHB fence and apply painting where applicable. 	<ul style="list-style-type: none"> • Pre/Construction phase 	<ul style="list-style-type: none"> • Included in all works

Parameter	<u>Impact Description</u>	<u>Mitigation Strategies</u>	<u>Schedule</u>	<u>Cost</u>
<ul style="list-style-type: none"> • NOISE 	<ul style="list-style-type: none"> • Noise Pollution 	<ul style="list-style-type: none"> • Locating substation/switchgears far from residential buildings. • Use of low-noise transformer / switchgears. • Use of enclosures, ventilators, or sound barriers to reduce noise. 	<ul style="list-style-type: none"> • Substation / switchgears construction 	<ul style="list-style-type: none"> • Included in the electrical works.
<ul style="list-style-type: none"> • TRANSFORMER OIL HAZARD 	<ul style="list-style-type: none"> • Transformer Oil Pollution 	<ul style="list-style-type: none"> • Use of non-PCB insulating oil. 	<ul style="list-style-type: none"> • Substation / switchgears installation 	<ul style="list-style-type: none"> • Included in the electrical works
<ul style="list-style-type: none"> • ELECTROMAGNETIC FIELD 	<ul style="list-style-type: none"> • Electromagnetic Field Radiation 	<ul style="list-style-type: none"> • Route cables/distribution lines away from areas with human activities. • Follow standard electrical clearances. 	<ul style="list-style-type: none"> • Electrical installation 	<ul style="list-style-type: none"> • Included in the electrical works

Parameter	<u>Impact Description</u>	<u>Mitigation Strategies</u>	<u>Schedule</u>	<u>Cost</u>
c) Abandonment Phase				
<ul style="list-style-type: none"> • END-OF-OPERATIONS 	<ul style="list-style-type: none"> • End-of-Operations Provisions 	<ul style="list-style-type: none"> • Upgrade, sell or recycle existing facilities but man-made structures be removed or re-engineered to suit other purposes and excavations are filled up. 	<ul style="list-style-type: none"> • End-of-Operations 	<ul style="list-style-type: none"> • Included in the abandonment contract.

6. ENVIRONMENTAL BENEFITS

6.1 Reduced Emissions

Scientific consensus indicates that human activity, particularly the intensive use of carbon-based energy sources, is altering earth's atmosphere in a way that could profoundly affect the global climatic system.

Studies suggest that photovoltaic, a renewable energy source, may figure prominently in our energy future and play a critical role in strategies for greenhouse gas control as well as directly displacing other gaseous emissions such as SO_x and NO_x.

For a PV project with an annual generated energy of 1,100,000 kWhrs, the following is the estimated equivalent annual emission reduction of air pollutants per type of fuel used.

<i>Pollutant</i>	<i>Bunker Diesel</i>	<i>Natural Gas</i>	<i>Coal</i>
CO ₂ (kg)	764,000	581,000	940,000
NO _x (kg)	590	388	4,230
SO ₂ (kg)	1,040	0.34	1,450

6.2 Resource-use Displacement

Adoption of renewable energy program such as the use of photovoltaic energy is being pursued in order to displace scarce natural resources and imported fossil fuel.

A 1MW photovoltaic plant, which produces an annual generation of 1,100,000 kWhrs, will displace approximately 1,500 barrels of oil yearly.

6.3 Social Costs Avoidance

This photovoltaic project will avoid social costs due to effects on human health because of toxic emissions such as SO_x and NO_x. A recent study by scientists revealed that the over-all social cost that ought to be added to the price of fossil-fuel electricity in order to pay for the consequential environmental damage lies between \$ 0.028/kWhr and \$ 0.16/kWhr (IT Power, 1996).

7. REGULATORY FRAMEWORK

7.1 Legal Basis

Mandated under the Local Government Code to share in the responsibility of managing and maintaining ecological balance and enhancing the right of the people to a balanced ecology within their territorial jurisdiction, Local Government Units (LGUs) in the Barangay or City, has the following functions:

- Assist in referring projects within in their respective jurisdiction to CENRO or PENRO;
- Serve as the forum for public participation in the local level;
- Participate as a member of the Multi-partite Monitoring Team/Environmental Guarantee Fund Committee and other appropriate committees that may be formed to implement the EIS system or monitor the projects within its territory; and,
- Coordinate with DENR/EMB in the dissemination of information and in monitoring the implementation of the EIS system.

7.2 Environmental Impact Assessment requirements:

- IEE description of substantive content;
- List of IEE Preparers and their respective expertise area;
- Sworn Accountability Statements of key IEE Preparers;
- Sworn Accountability Statements of Project Proponent;
- Process Documentation;
- Proof of Social Acceptability (LGU Certifications –Barangay and City, Endorsements, etc);
- Certificate of locational viability/locational clearance or zoning certificate;
- Application Fee

NOTE: Pursuant to Section 18, Article III of DAO 37, only accredited preparers/consultants/firms can prepare the IEE. At the minimum, IEE may be prepared by duly-accredited Environmental Associates.

7.3 Permits

The following are the required permits:

- Construction Permits (Fencing, Building, Electrical, Plumbing)
- Tree Cutting Permit

Figure 1

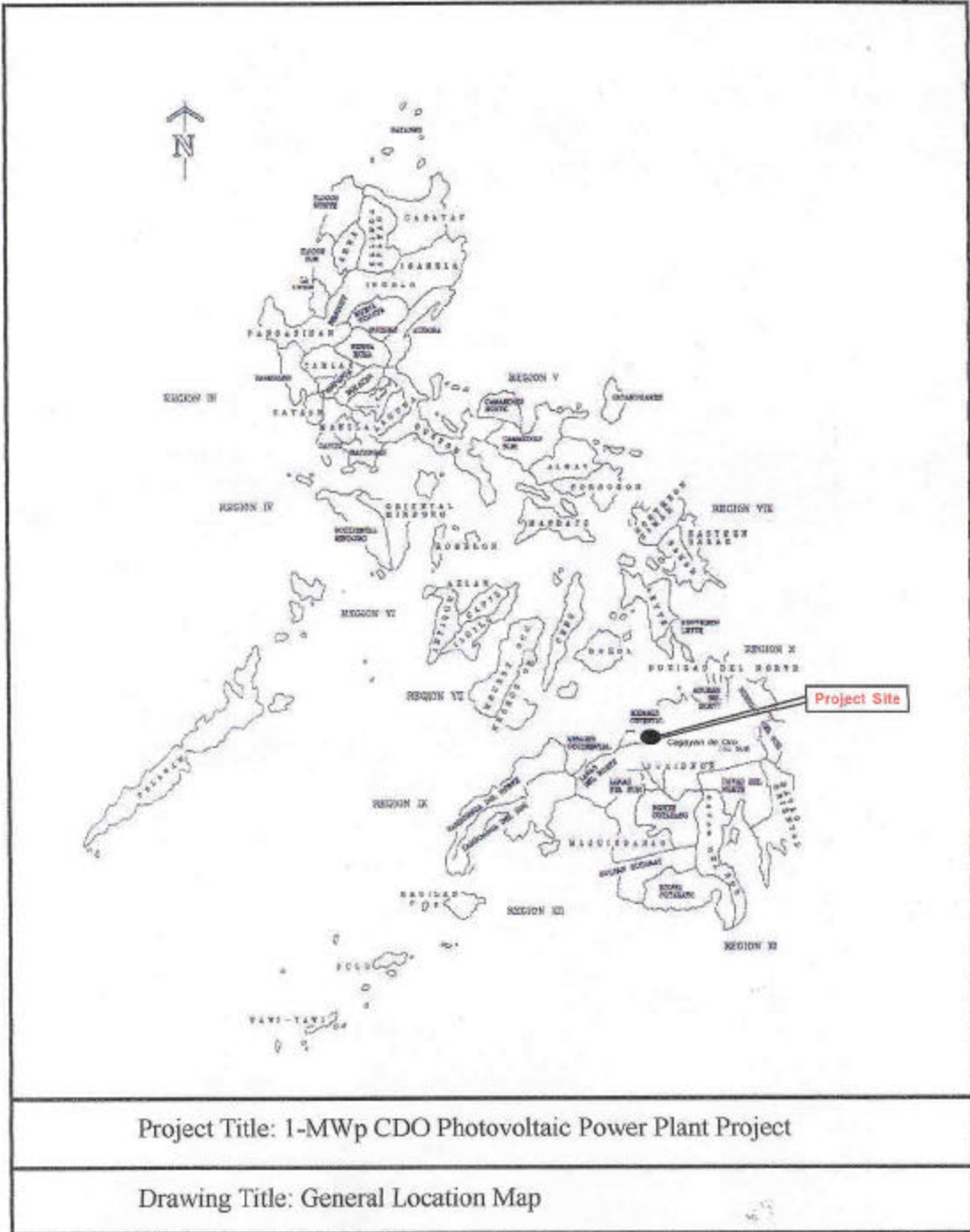
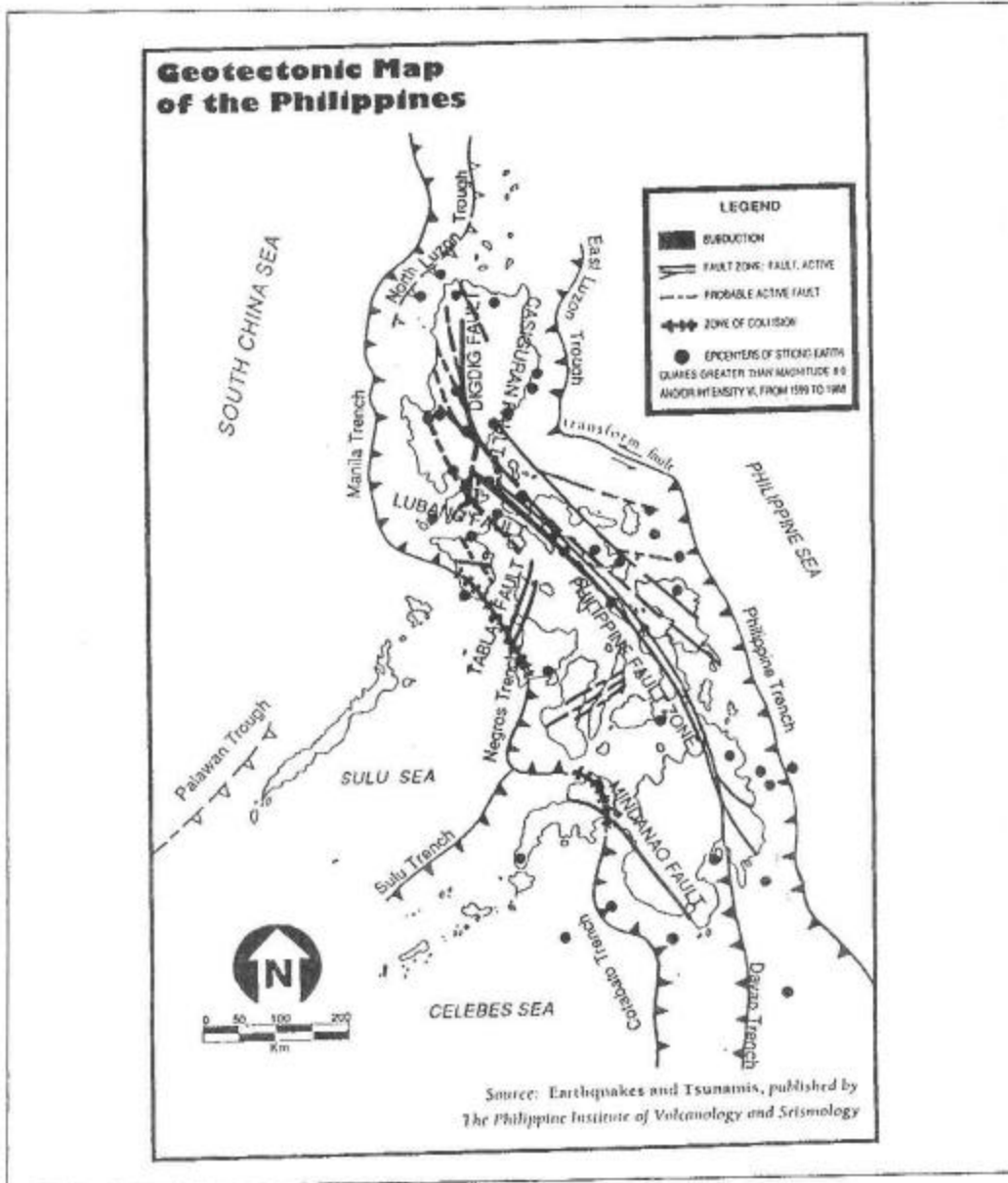
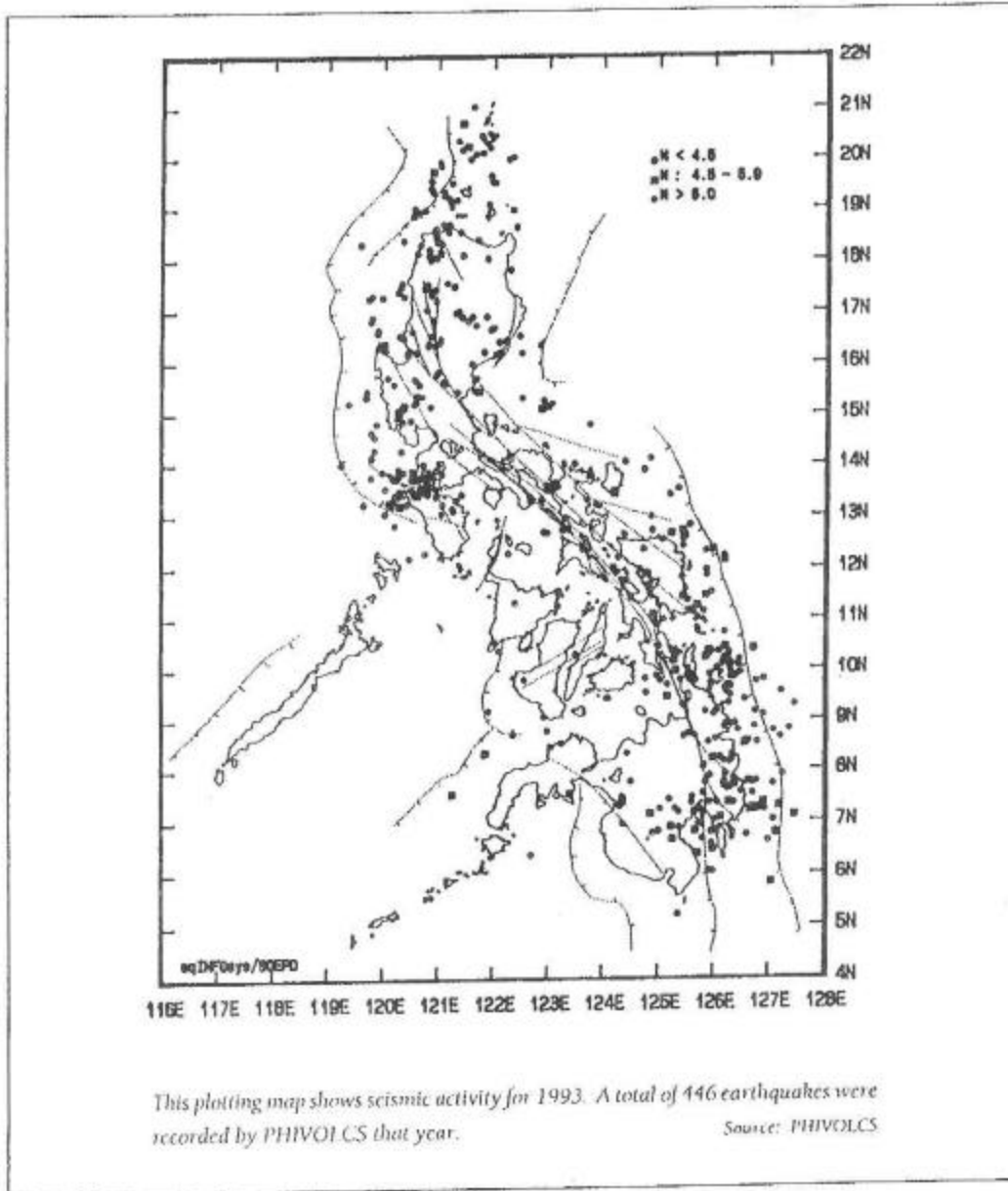


Figure 2



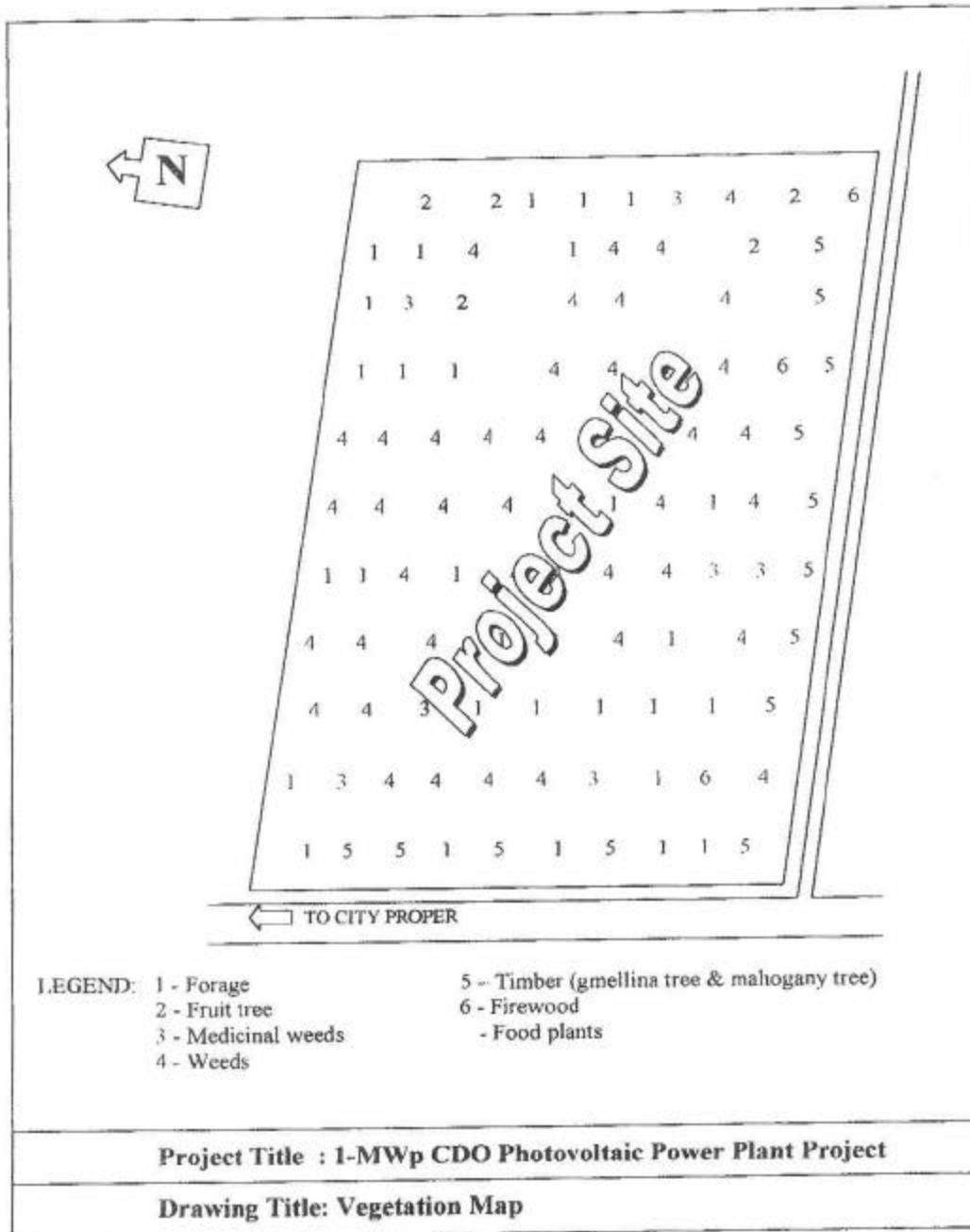






Project Title: 1-MWp CDO Photovoltaic Power Plant Project

Drawing Title: Nearest Water Body (Cagayan River)



Annex 3.1

SCOPING REPORT

of the

1 MW CAGAYAN DE ORO PHOTOVOLTAIC POWER PLANT PROJECT

Prepared for:



CAGAYAN ELECTRIC POWER & LIGHT CO., INC.
Cagayan de Oro City, Philippines

By

The Environmental Unit
CEPALCO

TABLE OF CONTENTS

- 1. PROJECT TITLE, NAME & ADDRESS OF PROPONENT**
 - 2. PROJECT DESCRIPTION**
 - 2.1 Objectives
 - 2.2 Location
 - 2.3 Components
 - 2.4 Activities
 - 3. POTENTIAL IMPACTS**
 - 3.1 Construction
 - 3.2 Operation & Maintenance
 - 3.3 Abandonment
 - 4. STAKEHOLDERS ISSUES & CONCERNS**
 - 5. AGREED UPON SCOPE**
 - 6. DOCUMENTATION**
 - 6.1 Meeting Attendance Sheets
 - 6.2 Minutes of the Meeting
 - 6.3 Photodocumentation
-

1. PROJECT TITLE, NAME & ADDRESS OF PROPONENT

- Project Title: **1 MW Cagayan de Oro Photovoltaic Power Plant**
- Name of Proponent: **Cagayan Electric Power & Light Co., Inc (CEPALCO)**
- Address of Proponent: **44 Toribio Chavez St. Cagayan de Oro City**

2. PROJECT DESCRIPTION

2.1 OBJECTIVES

- To provide additional source of electrical energy in order to accommodate future electrical load in the area;
- To displace potential air pollutants from fossil fuel power plants, by using solar power energy which is renewable & environment-friendly.

2.2 LOCATION

The proposed project is located approximately 850 km. SSE of Manila with coordinates: longitude 124°-40' E and latitude 8°-26' N. The project will be located at Sitio Lomboy, Barangay Indahag, and is approximately 4.5 kilometers south of Cagayan de Oro City poblacion.

2.3 COMPONENTS

- PV solar panels array
 - Fixed steel support structures facing south & inclined at 15°
 - Inverter
 - 1 MVA power transformer & system protection
 - Control building
 - Gravel road
 - CHB security fence
-

2.4 ACTIVITIES

- Land preparation
- Foundation excavation
- Concreting
- Support structure erection
- PV panels array installation
- Control bldg. Construction
- Cable trenches digging
- Installation of power cables, transfr. & system protection
- Testing & commissioning

3. POTENTIAL IMPACTS

<u>ISSUES</u>		<u>TYPE IMPACT</u>
■ Land use	(-)	Insignificant
■ Soil erosion	(-)	Insignificant
■ Flora & fauna	(-)	Insignificant
■ Noise	(-)	Insignificant
■ Socio-economic	(+)	Significant

4. STAKEHOLDERS ISSUES & CONCERNS

- 4.1 The effect of bad weather or lightning strikes on nearby populace and animals.
 - 4.2 The effect to customers during no sunlight.
 - 4.3 The environmental effect to nearby residents.
 - 4.4 Potential land improvements affected by the development.
 - 4.5 Local employment opportunities during construction.
 - 4.6 Potential electricity rate increase due to project development.
 - 4.7 Electrical service extension to areas not presently serve by CEPALCO.
-

5. AGREED UPON SCOPE

- 5.1 PV Plant will be equipped with electrical relays to ensure safety protection to life and property.
- 5.2 The PV plant will be inter-connected to existing substations to ensure reliable source of power.
- 5.3 There will be negotiations between CEPALCO and owners of improvements To arrived at a just compensation.
- 5.4 CEPALCO to recommend contractor to maximize local hiring.
- 5.5 Impact to electricity rates due to the PV project is considered very minimal if not negligible.

6. DOCUMENTATION (Please see attached)

- 6.1 Meeting Attendance Sheets
 - 6.2 Minutes of the Meeting
 - 6.3 Photodocumentation
-



PROPOSED
IMWP CAGAYAN DE ORO PHOTOVOLTAIC
POWER PLANT PROJECT
Sitio Lumboy, Barangay Indahag, Cagayan de Oro City



Barangay Hall, Indahag, Cagayan de Oro City
March 23, 2001 at 1:00 – 3:00 PM

(This serves as an invitation)

PROGRAMME

- I. Invocation
 - II. Panbansang Awit
 - III. Welcome Address
Hon. Carmilito Damo
Indahag Punong Barangay
 - IV. Acknowledgement of Attendees
Engr. Teodoro Cahoy
Supervisor, CEPALCO
 - V. Rationale of Scoping
Engr. Alex Jimenez
Head, EIA Section,
EMB/DENR -10
 - VI. Project Description
Engr. Cecilio Sumaoy
Project In-charge, CEPALCO
 - VII. Environmental Issues
Engr. Mario Sumalinog
Environmental Officer,
CEPALCO
 - VIII. Snacks/Open Forum
 - IX. Closing Remarks
Ms. Marlyn Chavez
Head, Community Relations
CEPALCO
- Moderator: Mr. Ramil Abcamonga*

CEPALCO

PROPOSED IMWP CAGAYAN DE ORO
 PHOTOVOLTAIC POWER PLANT PROJECT
 Sitio Lombog, Indalag, Cag. de Oro City

CONSULTATION MEETING

March 23, 2001

ATTENDANCE

1. Carlito Dalig
2. Placido Tablaazo
3. Edilberto Logas
4. Rogelio Magto
5. Margarita Macansag
6. Purito Jimtal
7. Pacifra CD Gabriel
8. Radwalf Geolgue - EMB - D
9. Edwin M. Bernal - CEPALCO
10. CARLITO J. SALAZAR - CEPALCO
11. MARILYN A. CHAVEZ - Cepalco
12. FLORITA C. CABANES - Xavier Univ.
13. Anita S. Mabao - Xavier Univ.
14. Jhat C. Palma - RIMCU Xavier University
15. Lolita S. Martinez - Bio Dept, XU
16. Lourdes A. Wong - RIMCU XU
17. Lucia A. Sabanal - RIMCU XU
18. RAMIL M. KORNONGS - CEPALCO
19. GEOFF WATKINS - IFA
20. Ally Isidro O. Baculis Jr. - Cepalco
21. Cecilio Sumag - Cepalco
22. MARIO B. SUMALING - CEPALCO
23. ALEX P. SIMONA - DENR - EMB - D
24. REYNIBL E. YANG

23.	CARMELITO R. DANO	<i>[Signature]</i>
26.	REYNALDO C. REPULO	<i>[Signature]</i>
27.	Mila H. Jimbal	<i>[Signature]</i>
28.	TEODORO V. CATON	<i>[Signature]</i>
29.	LEONARDO G. GUMALAL	<i>[Signature]</i>
30.	HARTEN PAINIT SR.	<i>[Signature]</i>
31.	SIRAPIN SURIBAO	<i>[Signature]</i>
32.	Alfio Reyes	<i>[Signature]</i>
33.	Lihin Suringo	<i>[Signature]</i>
34.	Rayado Hado	<i>[Signature]</i>
35.	Duroras Sifon	<i>[Signature]</i>
36.	Oreberis G. Lizo Sohan	<i>[Signature]</i>
37.	Milogroz Hallazgo	<i>[Signature]</i>
38.		

Cert. true copy
 From Prog. book
[Signature]
 REYNOLD E. YONG
 Barangay Secretary
 4/19/01

Annex 3.3

APPLICATION FOR ENVIRONMENTAL COMPLIANCE CERTIFICATE OF
1-MWp CAGAYAN DE ORO PHOTOVOLTAIC POWER PLANT
LOCATED AT SITIO LOMBOY, INDAHAG
CAGAYAN DE ORO CITY

-- oOo --

Minutes of Public Consultation Meeting
held at Barangay Hall, Indahag, Cagayan de Oro City
on March 23, 2001

Attendees:

1. Brgy. Chairman Carmelito R. Damo
2. Members of Indahag Barangay Council & Officials
3. Chief, Environmental Impact Assessment Section, DENR-10
4. Engr., Environmental Impact Assessment Section, DENR-10
5. Staff, Biology Department, Xavier University
6. Staff, RIMCU, Xavier University
7. Staff, Cagayan Electric Power & Light Co., Inc.
8. Mr. Geoff Waite, Consultant, International Finance Corporation
9. Invited Constituents and Landowners Near the PV Plant Site

The meeting started at 1:30 PM.

After the opening program, the following were the highlights of the meeting:

1. Barangay Chairman Carmelito R. Damo in his address welcomed the participants and guests and it was followed by the acknowledgement of all that were attending the Public Consultation Meeting.
 2. Engr. Alex D. Jimenez, Chief, Environmental Impact Assessment Section, DENR-10, addressed the attending public the importance and rationale of the scoping process, being a systematic requirement of Environmental Impact Assessment of the Department of Environment and Natural Resources of any project that will be constructed in a locality. He pointed out that the project proponent must conduct a public consultation and scoping to gain reactions, concerns, and inputs from the affected constituents. The benefits from the project to the local constituents and its effect to the environment were among the concerns that were mentioned.
 3. Engr. Cecilio Sumayo, CEPALCO PV Project Incharge, presented to the attendees the following: a) what is a photovoltaic power plant, b) description of the project, and c) benefits from the project to the barangay and the city of Cagayan de Oro, as a whole. He explained to the attendees the operation of a photovoltaic power plant and how the sunlight as source of energy is converted into electric energy. Presented to the attendees was the project description; its purpose, physical composition and its approximate project cost. It was mentioned that the project is in conjunction with the program of the government to the
-

establishments of environmental-friendly projects. The photovoltaic power plant project will be operated in tandem with the power generation of Bubunawan Hydro Power Plant in Baungon, Bukidnon.

The project will be the first in Asia based on its size and capacity and will be financed by the International Finance Corporation under the Global Environmental Facilities. The power that will be generated from the project will provide more reliable power supply to the people of the neighboring areas and will ultimately benefit the whole city as well, since this would augment load capacity.

4. Engr. Mario B. Sumalinog, CEPALCO Environmental Officer, addressed the attending public on the environmental issues and concerns of the project. An illustration was presented on the effect to the environment of a photovoltaic power plant compared to other power generating plants using fossil fuel. The photovoltaic power plant does not emit smoke, produces no noise and is considered to have zero environmental hazard compared to other energy sources using fuel for power generation.
 5. During the open forum, the major concerns that were raised were:
 - The effect to the nearby populace and animals during bad weather or when lightning strikes, to which the project proponent gave technical explanation that lightning strikes to the highest standing structure and that the solar panels are installed at a height near the ground. Regarding the electrical installation, the power plant will be equipped with overcurrent protections that will ensure safety to life and property.
 - If no sunlight will be available for days, what would be the effect to the customers that will be served by the electricity from the photovoltaic power plant? The project proponent explained that the distribution system connected to the plant would also be connected to the distribution system from power substations of CEPALCO, thereby assuring a reliable source of power.
 - The effect of environment and nearby residents, to which the project proponent further explained that since the source of power is the sunlight, there will be a very minimal or even zero effect to the environment and to the residents near the project site.
 - On land and improvements that will be affected by the project and its electric lines. The project proponent assured the public that in any case where land or improvements will be affected, there will be a proper negotiation between CEPALCO and the owner of affected land or improvements and a just compensation shall be considered in case if necessary.
 - Local employment during construction was raised to which the project proponent responded that in the request of bids for the project, optimizing the use of manpower during construction would be emphasized to give local and unskilled labor a work slot.
 - The effect of the project cost may relate to a corresponding increase of electricity rate to the consuming public, to which the project proponent cited the financial grant for the project of about US\$4.0 Million from the IFC-GEF will ensure that the power rate that will be charged to the consuming public will be the same as the rate of power taken from the National Power Corporation (NPC). Meaning, the cost of the photovoltaic power plant will result in no negative impact on the power rate.
-


- Other matter raised was the request of Brgy. Chairman Damo of electric line extension to some areas of Indahag who have no electricity yet, to which CEPALCO assured the barangay chairman that the request will be given consideration and a schedule for a survey was set on Wednesday, March 28, 2001.
- 6. After accommodating all questions and concerns of the affected constituents, Barangay Chairman Damo asked his constituents as a sort of summing up the overall result of the public consultation if they are all in favor and in support of the project. To this question, all the affected constituents answered "yes".
- 7. Ms. Marlyn A. Chavez, CEPALCO's Head of Community Relations Department, delivered the closing message and expressed gratitude to the participants for sparing their precious time to the invitation. She encouraged questions that were not raised during the Public Consultation Meeting could still be asked to CEPALCO or its project representative/s and will be cordially answered.

The meeting adjourned at around 4:00 PM.

NOTE: The attendance list of this Public Consultation Meeting is attached.


We HEREBY CERTIFY to the correctness of the foregoing minutes.

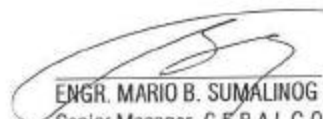
Attested by:


CARMELITO R. DAMO
Brgy. Chairman, Indahag
Cagayan de Oro City


REYNIEL E. YTANG
Brgy. Secretary, Indahag
Cagayan de Oro City


NEMECIO RIMBAL
Representing the
Affected Constituents


ENGR. ALEX D. JIMENEZ
Chief, EIA-EMB
DENR - 10


ENGR. MARIO B. SUMALINOG
Senior Manager, CEPALCO
Project Proponent

Annex 3.4



Indahag Barangay Chairman Carmelito R. Damo in his welcome address during the Public Consultation Meeting of the Photovoltaic Project held at the Barangay Hall at Indahag, Cagayan de Oro City.



Engr. Alex D. Jimenez, Chief, Environmental Assessment Section of the Environmental Management Bureau, DENR 10 addressed the public on the importance and rationale of the scoping process of the project that will be constructed in the locality.



Engr. Cecilio U. Sumaoy, CEPALCO PV Project Incharge, presented to the attending public the technical information of the photovoltaic power plant, description of the project and the benefits that could be derived from the project.



Engr. Mario B. Sumalinog, CEPALCO Senior Manager and Environmental Officer, addressed the public on the environmental issues and concerns of the project.



Some of the invited constituents who were attending the Public Consultation Meeting at the Barangay Hall at Indahag, Cagayan de Oro City

Accountability Statement of the Project Proponent

This is to certify that all the information in the enclosed Initial Environmental Examination (IEE) is true, accurate, and complete. Should we learn of any information which would make the enclosed IEE inaccurate, we shall bring said information to the attention of the Environmental Management Bureau (EMB) or the Environmental Management and Protected Areas Sector (EMPAS) of the appropriate DENR Regional Office.

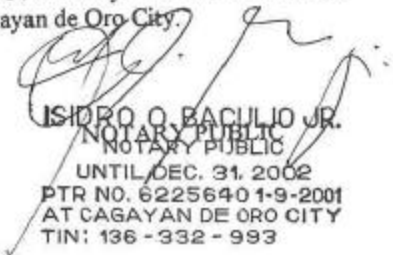
We hereby bind ourselves jointly and solidarily with the preparers for any penalties that may be imposed arising from any misrepresentations or failure to state material information in the enclosed IEE.

In witness whereof, we hereby set our hands this ___th day of _____, 2001 at Cagayan de Oro City, Philippines.


CONSUELO G. TION
Project Proponent

President and C O O
Title / Designation

SUBSCRIBED AND SWORN to before me this 30th day of May, 2001 at Cagayan de Oro City, Philippines, affiant exhibiting to me her Tax Identification Number (TIN) 136-334-903 and Community Tax Certificate No. 19397253 issued on 1-30-01 at Cagayan de Oro City.


ISIDORO O. BACULJO JR.
NOTARY PUBLIC
UNTIL DEC. 31, 2002
PTR NO. 6225640 1-9-2001
AT CAGAYAN DE ORO CITY
TIN: 136 - 332 - 993

Doc. No. : 420
Page No. : 84
Book No. : XIII
Series of 2001.

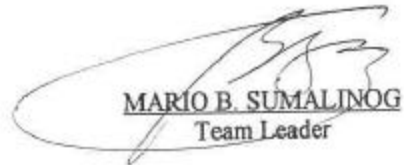
Annex 4.2

Accountability Statement of IEE Preparers

This is to certify that all the data or information contained in the enclosed Initial Environmental Examination (IEE) are true to the best of our knowledge and information, and that an objective and thorough assessment of the project was undertaken in accordance with the dictates of reasonable and sound judgement. Should we learn of any information which would make the enclosed IEE inaccurate, we shall bring said information to the attention of the Environmental Management Bureau (EMB) or Environmental Management and Protected Areas Sector (EMPAS) of the appropriate DENR Regional Office.

We hereby bind ourselves jointly and solidarily to answer any penalties that may be imposed for any misrepresentations or failure to state material information in the enclosed IEE.

In witness whereof, we hereby set our hands this ____th day of _____, 2001 at Cagayan de Oro City, Philippines.

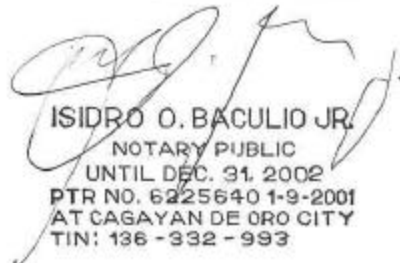

MARIO B. SUMALINOG
 Team Leader

SUBSCRIBED AND SWORN to before me this ____th day of _____, 2001, affiants exhibiting to me their Community Tax Certificate (CTC), the number, date and issuance of which are set forth beside their names as herein enumerated:

<u>Name</u>	<u>CTC Number</u>	<u>Issued at</u>	<u>Issued on</u>
1. Mario B. Sumalinog	14406896	CDO	2-8-2001
2. Teodoro V. Cahoy	10357332	CDO	1-10-2001
3. Josephine Zarsuelo	1938994	CDO	1-22-2001
4. Dulce Dawang	14438282	CDO	3-26-2001
5. Lita Palma-Sealza	19373222	CDO	1-11-2001

NOTARY PUBLIC

Doc. No. : 419
 Page No. : 24
 Book No. : 811
 Series of 2001.


ISIDRO O. BACULIO JR.
 NOTARY PUBLIC
 UNTIL DEC. 31, 2002
 PTR NO. 6225640 1-9-2001
 AT CAGAYAN DE ORO CITY
 TIN: 136 - 332 - 993

Annex 4.3

List of IEE Preparer and Expertise

<u>Name</u>	<u>Designation</u>	<u>Fields of Expertise / Skills</u>
1. Mario B. Sumalinog	Team Leader	Environmental Management Civil Engineering Electrical Engineering Structural Engineering Tech Management Engineering Pollution Control
2. Teodoro V. Cahoy	Specialist	Electrical Engineering Agricultural Engineering
3. Josephin Zarsuelo	Specialist	Biology
4. Dulce Dawang	Specialist	Biology
5. Lita Palma-Sealza	Specialist	Sociology

Annex 5.1

CERTIFICATION FROM THE LOCAL GOVERNMENT UNIT

This is to CERTIFY that the undersigned has understood the implication of:


Cagayan Electric Power & Light Co., Inc.
Project Proponent

1 - MWp CDO Photovoltaic Power Plant
Name / Type of Project

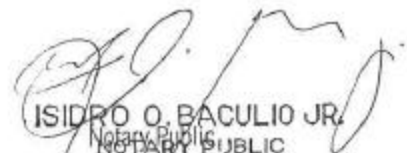
Sitio Lombay, Indahag, Cagayan de Oro City
Project Location

to the surrounding areas. Further, I certify that I have consulted my respective constituents and they interpose no objection whatsoever against the project, instead we recommend its operation because it will provide employment and upliftment of the living conditions in our community.

Done this 3rd day of March, 2001 at Barangay Indahag, Cagayan de Oro City.


CARMELITO R. DAMO
Punong Barangay
Barangay Indahag
Cagayan de Oro City

SUBSCRIBED AND SWORN to before me, this 8 th day of March, 2001, affiant exhibiting to me his Community Tax Certificate No. 19368266, issued on Jan. 6, 2001 at Cagayan de Oro City.


ISIDRO O. BACULIO JR.
Notary Public
UNTIL DEC. 31, 2002
PTR NO. 6225640 1-9-2001
AT CAGAYAN DE ORO CITY
TIN: 136 - 332 - 993

Doc. No. 261
Page No. 53
Book No. xiii
Series of 2001.

Republic of the Philippines
City of Cagayan de Oro
BARANGAY INDAHAG

RESOLUTION No. 0038-2001

RESOLUTION FAVORABLY ENDORCING THE PROPOSED PROJECT OF CEPALCO, CAGAYAN DE ORO CITY TO CONSTRUCT A 1-MWP PHOTOVOLTAIC POWER PLANT AT SITIO LOMBOY, BARANGAY INDAHAG, THIS CITY.

WHEREAS, the said proposed photovoltaic power plant provide more reliable electric power supply to the people of Indahag and neighboring areas and will ultimately benefit the whole city as well, since this would augment load capacity;

WHEREAS, that the project rationale presented, to displace potential air pollutants from fossil fuel power plants by using solar energy which is renewable and environment friendly.

WHEREFORE, on motion of Barangay Kagawad Honorato P. Boyles and severally seconded, it was

RESOLVED, as the Barangay Council of Indahag, Cagayan de Oro City hereby resolves, as it hereby favorably endorse the proposed project of CEPALCO, Cagayan de Oro City to construct A 1-MWp Photovoltaic Power Plant at Sitio Lomboy, Barangay Indahag, this city.

UNANIMOUSLY APPROVED

Done this 26th day of March, 2001 at Indahag, Cagayan de Oro City.

I HEREBY CERTIFY that the above resolution is true and correct.


CARCELITO R. DAMO
Barangay Chairman

Attested:


REYNIEL E. YTANG
Barangay Secretary



Photo 1: Western Side of the PV Project Site



Photo 2: Northern Side of the PV Project Site



Photo 3: Southern Side of the PV Project Site



Photo 4: Eastern Side of the PV Project Site



Photo 5: Inner Portion of the PV Project site