

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

CPA-28

Methane Recovery and Power Generation Project

Ref. No. 5979-0011

Methane Recovery and Combustion with Renewable Energy Generation from Anaerobic Animal Manure Management Systems under the Land Bank of the Philippines' Carbon Finance Support Facility

June 2019

LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
CDM	Clean Development Mechanism
CFSF	Carbon Finance Support Facility
CMR	Compliance Monitoring Report
CSR	Corporate Social Responsibility
DENR	Department of Environment and Natural Resources
DNA	Designated National Authority
DO	Dissolved Oxygen
DOE	Designated Operational Entity
DP	Discharge Permit
ECC	Environmental Compliance Certificate
EMB	Environmental Management Bureau
EMF	Environmental Monitoring Fund
EPMD	Environmental Program and Management Department
ERPA	Emissions Reduction Purchase Agreement
ESMP	Environmental and Social Management Plan
ESSF	Environmental and Social Safeguards Framework
LBP	Land Bank of the Philippines
MOA	Memorandum of Agreement
MRF	Methane Recovery Facility
MSDS	Materials Safety Data Sheet
PCO	Pollution Control Officer
P.D.	Presidential Decree
PoA	Program of Activity
PPE	Personal Protective Equipment
PTO	Permit to Operate
R.A.	Republic Act
SMR	Self-Monitoring Report
SPA	Subproject Agreement
TSD	Treatment / Storage / Disposal
TSS	Total Suspended Solids
WTF	Water Treatment Facility

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PURPOSE OF THE DOCUMENT

This Environmental and Social Management Plan (ESMP) is prepared as part of the requirements of the Safeguards Framework for Clean Development Mechanism (CDM) projects implemented under the Carbon Finance Support Facility (CFSF) of the Land Bank of the Philippines (LBP). The Environmental and Social Safeguards Framework (ESSF) was developed to ensure the establishment of protection, compliance, and mitigation measures for relevant environmental and social aspects of projects under the CDM program which covers the Methane Recovery and Power Generation Projects in pig farms.

Scope

Since the Methane Recovery and Power Generation Project is a key component of CPA-28's wastewater treatment facility (WWTF) – which handles the primary waste (manure) produced by its operations – this ESMP thus encompasses the operations of the entire farm described herein

1 PROJECT SUMMARY

The Methane Recovery and Power Generation Project of CPA-28, is an initiative developed under LANDBANK's CFSF. Its goal is to capture greenhouse gases, particularly methane from piggery wastewaters that would otherwise dissipate into the atmosphere, and convert them into electrical energy.

1.1 Proponent Profile

Proponent: CPA-28
Business Address: Calumpang Ave., Brgy. Calumpang, General Santos City

Farm Name: CPA-28
Project Site: Upper Baluan, Brgy. Buayan, General Santos City
Farm Coordinates:

Project Type: Livestock Project
Philippine Standard
Industrial Classification: 0145 - Hog Farming

Contact Persons CPA-28
Farm Manager:
Telephone No.:

Pollution Control Officer:
Telephone No.:

LANDBANK

Lending Programs

Management Group: Emellie V. Tamayo
Designation: Head / First Vice President
Telephone No.: (632) 405-7309
Fax No.: (632) 528-8542

Environmental Program

Management Department: Prudencio E. Calado III
Designation: Head / Assistant Vice President
Telephone No.: (632) 405-7339
Fax No.: (632) 528-8484

1.2 Pig Farm Profile

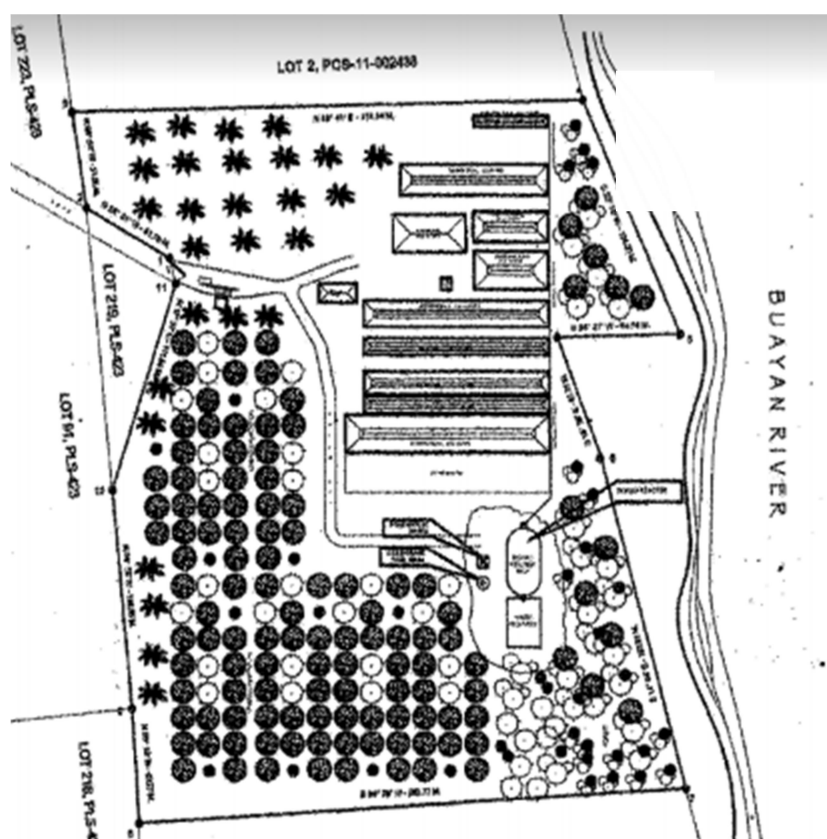


Figure 1. Site layout of CPA-28.

Farm area:	161,735 m ²
Production:	Farrow-to-Finish
Housing type:	Conventional
Capacity:	1,000 sow level
Average population:	9,867 heads (As of March 2019)
No. of Employees:	40
Operating hours:	24

Facilities observed at the farm are as follows: pig houses (9), biogas digester (1), feed mill (1), staff house (1), office building (1) and bunk houses (4).

Water for the Farm's operations is sourced from groundwater extraction wells found within the farm.

As of the site visit on March, 2019, pig wastes are being directed to the site's biodigester system. The farm currently utilizes electricity produced by the biodigester for approximately 4 to 12 hours per day, depending on the amount of methane available.

The Farm is powered by the local electricity concessionaire, South Cotabato Electric Cooperative (SOCOTECO 2).

1.3 Project Description

The project covers the operation and installation of an anaerobic digester system and its ancillary facilities, including post-treatment wastewater lagoons and a biogas-powered electricity generation system. These are collectively referred to as the farm's methane recovery facility (MRF).

1.3.1 Components and Design

CPA-28's wastewater treatment process is as follows:

- *Pre-Treatment*, which involves the breaking down of relatively large digestible particles in wastewaters prior to entering the reactors;
- *Anaerobic digestion*, or the disintegration of biodegradable materials in the wastewaters through biological processes facilitated by microbes which thrive in the conditions promoted by the reactor; and
- *Post-Treatment* of biogas, effluent, and sludge resulting from anaerobic digestion.

The farm's wastewater treatment facility is composed of drainage canals, a collection tank, an underground concrete biodigester, a steel methane collection tank, and clarifying lagoons/sludge drying beds.

The biodigester, by design, is able to accommodate wastes for up to 10,000 heads and capture enough methane to power the project facilities with a net energy requirement of zero. The design and layout of the WWTF are in the construction plans in Appendix A. Properties and specifications of the WWT-MRFs, including capacities, outputs, and efficiencies, will be detailed in the succeeding version of this ESMP.

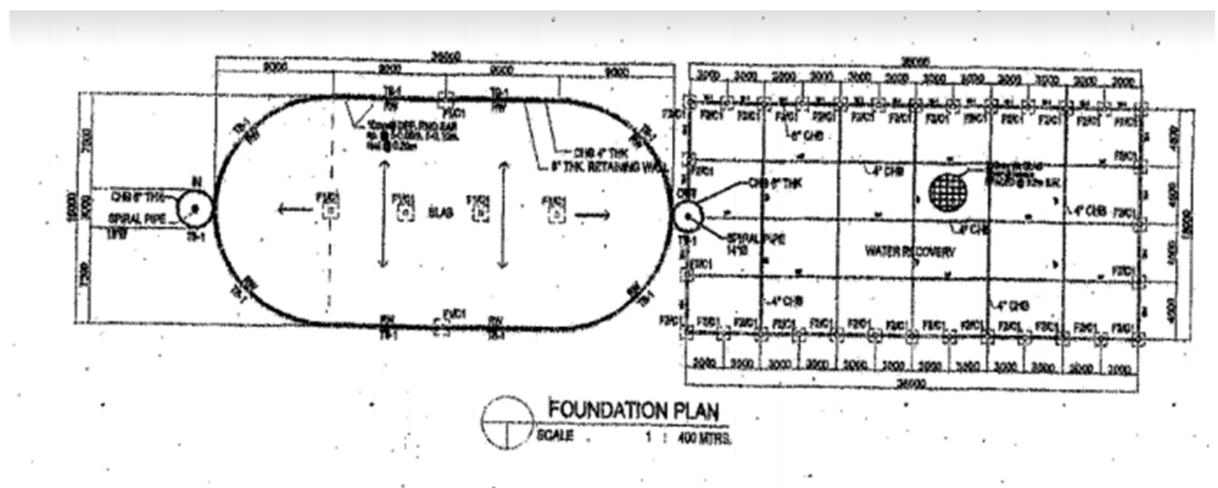


Figure 2. Floor plan of the biodigester of CPA-28.



Table 1. Specifications of CPA-28's Wastewater Treatment Facility-Methane Recovery Facility

Phase	Process	Component	No. of Units	Description / Equipment
Pre-treatment	Settling	pre-storage settling tank	1	Concrete construction, open
Anaerobic treatment	anaerobic digestion / fermentation	Concrete biogas fermentation chamber	1	18 m x 30 m x 4.8 m
Post-treatment	Biogas	scrubber system	1	Steel piping system
		generator set	1	225 kWh
	Effluent	clarification (settling, aeration)	1	18 m x 18 m x 2.0 m
	Sludge	drying	1	15 m x 30 m x 0.5

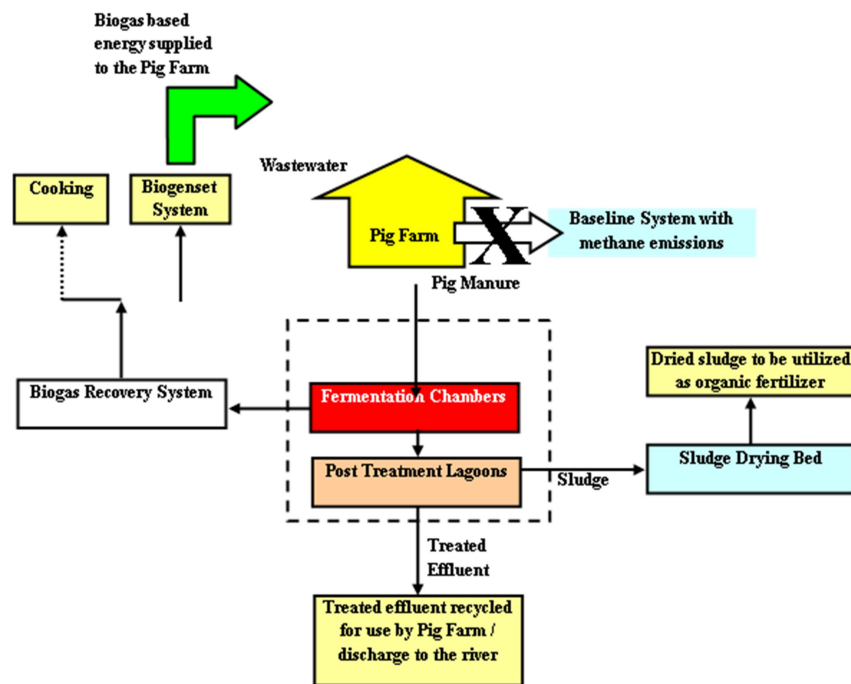
1.3.2 Operation

Wastewater from the pig sheds are channeled to a covered drainage system constructed beneath and around the pig sheds. Wastewaters flow through the drainage system towards the concrete underground biodigester. A system of screens ensures that solids are unable to enter the biodigester system..

The biodigester processes the wastewater through anaerobic digestion to produce methane. The methane is channeled via blowers to the methane containment tank. The pressure build-up within the containment tank allows the methane to flow through a series of scrubbers and to the biogas generator set for conversion to electricity.

The effluent from produced by the biodigester is then directed to a lagoon for drying. The sludge is removed manually and then used as fertilizer for the farm.

The figure below illustrates the processes involved in wastewater treatment and methane recovery:



1.4 Existing Environmental Conditions in the Farm

CPA-28 is a 161,735 m² facility located in Brgy. Buayan, General Santos City, South Cotabato, Philippines.

1.4.1 Land Classification and Use

The land on which the farm is situated is classified as an agro-industrial zone. The farm is surrounded by coconut plantations and low-density residential areas.

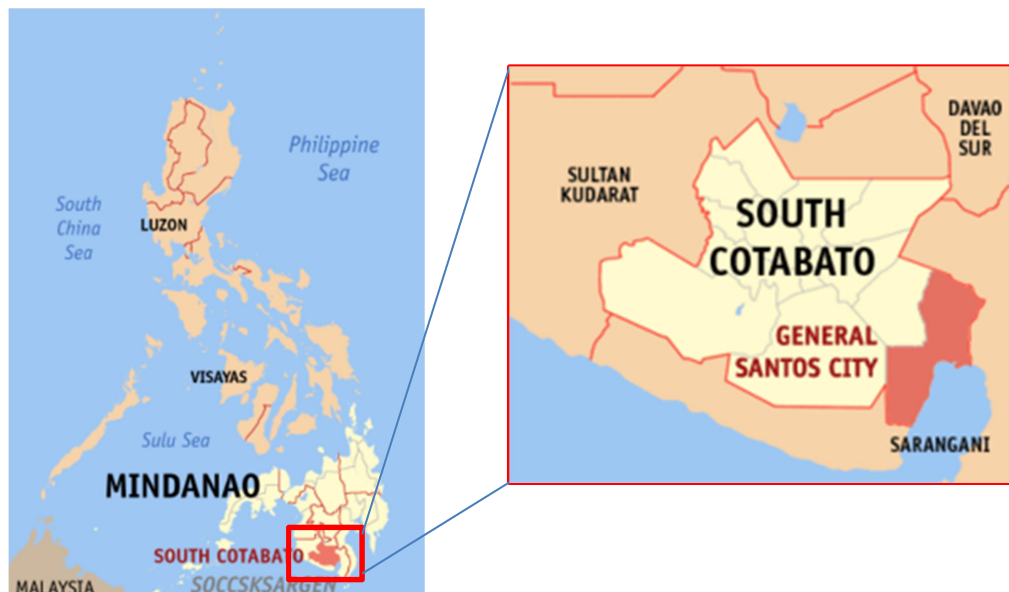


Figure 3. Map of the Philippines showing the location of General Santos City

Figure 4. Map of Barangay Buayan showing the location of CPA-28 (highlighted in green)

1.4.2 Climate

Köppen-Geiger system classifies the climate in General Santos City as Tropical Wet and Dry, with an average annual temperature of 27.0 °C and average precipitation of 1052 mm.

1.4.3 Topography and Soil

Based on the topographic map published by NAMRIA (<http://www.namria.gov.ph/4013-IIIGeneralSantosCity.html>), the farm sits on flat ground in an area primarily composed of crop lands and coconut plantations.

1.4.4 Water Resources

The farm is primarily surrounded by agricultural lands to its north, west and southern perimeters. The Buayan River is located approximately 100 m east of the farm and is the major tributary of the Buayan-Malungon River Basin. The Buayan-Malungon River Basin is considered as a *Priority River Basin* due to their importance in transportation, irrigation and household use (<https://www.cbd.int/doc/world/ph/ph-nr-04-en.pdf>). Since the farm has a functioning biodigester system installed, they do not discharge any wastewater to the Buayan River or any other water body.

1.4.5 Natural Hazards

According to the Flood Susceptibility Map of Dadiangas Quadrangle published by DENR-MGB Region XII, Barangay Buayan has high flood susceptibility. The Barangay is assessed to have a low susceptibility to landslides as per the Landslide Susceptibility Map of Dadiangas Quadrangle as published by DENR-MGB Region XII. According to site interviews conducted on September 4, 2018, the farm has not experienced any severe case of flooding or landslides.

1.4.6 People and Communities

Low density residential areas are located within 20 meters west of the farm.

2 ENVIRONMENTAL DUE DILIGENCE

2.1 Impact Assessment

2.1.1 Positive Impacts

The Project improves CPA-28's method of handling and disposing pig manure and liquid waste. At present, the biodigester functions as the Farm's main wastewater treatment facility, significantly improving the quality of and minimizing foul smell from its effluent. And, more importantly, by providing a mechanism to capture methane and use it as a source of energy, the Project has been helping the Farm abate its overall greenhouse gas emission. With a capacity for 10,000 heads, the Project is estimated to reduce greenhouse gas emissions equivalent to 6,673 tCO₂e over the duration of the project.

Also, having been included in the CDM program, the farm has the opportunity to earn monetary incentives by selling their carbon credits.

2.1.2 Negative Impacts

Certain aspects of the pig farms' and the project's operations inevitably result in potential harm to the environment, including generation wastewaters; hazardous and non-hazardous wastes; air pollutants; foul odors, noise, dust and other nuisance; and depletion of natural resources. These pose inherent risks to environmental quality and natural ecosystems and to health and safety of workers, communities, and livestock.

2.2 Due Diligence

CPA-28 is compliant to all the regulatory safeguards as shown in the succeeding tables, as enforced by the Philippine government, demonstrating due diligence of the Proponent.

2.2.1 Legal Framework

The farm operates in the context of laws prescribing the regulatory safeguards in Table 1 and 2.

Table 2. Environmental documents and statutory requirements regulating the operations of CPA-28.

Document	Particulars	
Environmental Compliance Certificate (ECC)	Reference No.	ECC-R12-1409-0080 (amended)
	Issuing Agency	DENR EMB Region 12
	Date of Issuance	September 22, 2014
	Validity	NA
	Conditions	<ul style="list-style-type: none"> • 1,000 sow level capacity • 3 MT feed mill • 161, 735 m² lot area
Discharge Permit for Water Pollution Source / Control Facilities	Reference No.	15-WDP-F-1263-104
	Issuing Agency	DENR EMB Region 12
	Date of Issuance	June 11, 2015
	Validity	June 2, 2020
	Conditions	<ul style="list-style-type: none"> • Submission of quarterly SMR
Permit to Operate Air Pollution Source Control Installations	Reference No.	14-POA-J-1263-362
	Issuing Agency	DENR EMB Region 12
	Date of Issuance	-not legible-
	Validity	September 30, 2019
Hazardous Waste Generator ID	Registration No.	GR-R12-63-00141
	Approving Agency	DENR EMB Region 12
	Date of Approval	July 12, 2016
Water Permit	Reference No.	(For Application)
	Issuing Agency	National Water Resources Board
PCO Accreditation Certificate	Accreditation No.	2014-R12-0069
	Issuing Agency	DENR EMB Region 12
	Date of Issuance	November 13, 2014
	Validity	November 13, 2017 (for renewal)

^ Environmental Management Bureau

a Self-Monitoring Report; b Compliance Monitoring Report

Table 3. Permits ensuring the safety of CPA-28's facilities and operation

Document	Particulars	
Business Permit	Permit No.	AVAILABLE and UP TO DATE
	Issuing Agency	
	Date of Issuance	
	Validity	
	Prerequisites	<ul style="list-style-type: none"> • Building Permit • Occupancy Permit • Zoning Clearance • Fire Clearance • Sanitary permit
Zoning Clearance	Registration No.	AVAILABLE and UP TO DATE
	Approving Agency	
	Date of Approval	
	Validity	
	Prerequisites	<ul style="list-style-type: none"> • Inspection of facility
	Conditions	•
Fire Clearance	Accreditation No.	AVAILABLE and UP TO DATE
	Issuing Agency	
	Date of Issuance	
	Validity	
	Prerequisites	<ul style="list-style-type: none"> • Microbial water analysis • Pest control • Health certificate of employees
	Conditions	•
Sanitary Permit	Reference No.	AVAILABLE and UP TO DATE
	Issuing Agency	•
	Date of Issuance	•
	Validity	•
	Prerequisites	•
	Conditions	•

2.2.2 Preventive and Mitigating Actions for Major Negative Impacts and Risks

Wastewaters

- ▮ Surfacewater contamination is prevented by treating all pig wastewaters in the WWTFs. The WWTF is kept in optimal working condition through regular inspection and maintenance activities. This ensures that effluents meet Class C quality standards set by EMB.
- ▮ Biodigesters have been constructed with durable materials.
- ▮ Technical specifications and actual performance of the WWTF-MRF will be determined to know the system's efficiency. Information on these will enable the farm to optimize its operations and improve (or maintain) the WWTF-MRF's performance.

Hazardous Wastes

- ▮ The farm is registered as hazardous waste generator and is able to dispose through accredited TSD (transport, storage, disposal) providers.
- ▮ Currently, pig carcasses and potentially hazardous wastes are placed in a mortality pit (repurposed septic tank).

Odor

- ▮ Treatment in the WWTF-MRF has significantly abated odors coming from effluents.
- ▮ Trees have been planted within and around the farm.
- ▮ The biogas collection system has been constructed with durable materials and is kept in good working condition through regular inspection and maintenance activities.

Groundwater Depletion

- ▮ Water conservation measures are being implemented in the farm.
- ▮ The farm will secure a Water Permit to comply with existing regulations and recompense for its consumption of groundwater.

2.2.3 Environmental Management and Monitoring Plan

Table 3 summarizes the measures intended to address the environmental impacts and risks identified in Section 2.1.2. Adequate training will be given to concerned employees to ensure that the content of this environmental management plan will be properly carried out.

Table 4. Environmental Management Plan of CPA-28.

IMPACT	SOURCE / ACTIVITY	MEASURES	STATUS			MONITORING METHOD	FREQUENCY	PARAMETER / INDICATOR	RESPONSIBLE ENTITY	REPORTING TO	Cost, Php
			Existing / Current Practice	For Implementation / Under Construction	Adoption Under Review						
A. Wastewater											
a.1 generation of wastewater	pig raising	water conservation strategies	✓			quantify wastewater production	monthly	volume of wastewater produced	Farm pesronnel	Farm Manager	
		treatment of wastewater in WWTF	✓								
a.2 generation of domestic wastewater	general farm activities	water conservation strategies	✓			check siphoning and hauling records	every 5 years	volume of sewage hauled	PCO	Farm Manager	Siphoning costs
		sewage septic tanks	✓								
		sewage disposal and hauling by accredited hauler	✓								
B. Solid Waste											
b.1 generation of manure, sludge	pig raising, feed wastage, WTF	minimize feed wastage	✓			quantify (dried) sludge produced	monthly	amount of sludge produced	biodigester operators	PCO	Feed costs
		- fixed feeding schedule;									
		treatment of manure in WWTF	✓								
		sludge used as soil conditioner	✓								
b.2 generation of (non-infectious) carcasses, blood	injuries, adverse environmental conditions, etc.	observe sound pig raising practices and biosecurity measures	✓			weigh disposed materials	Daily, or as needed	weight of materials disposed	Farm personnel	PCO	Php 50,000 for staff salaries
		carcass disposal burial in mortality pit	✓								
b.3 generation of general solid wastes	general farm activities	waste segregation	✓			weigh solid wastes disposed of (recyclables and residuals)	every hauling	weight / details on wastes generated, stored, and disposed of	Farm personnel	PCO, Farm manager	Carcasess sold by the kilo
		provides adequate collection bins, storage area in strategic locations	✓								
		reduce, reuse, recycle of materials	✓								
C. Hazardous Materials											
c.1 generation of hazardous, toxic wastes	facilities' operation and maintenance	monitor resource usage to avoid expiration of chemicals, etc.	✓			quantify each type of hazardous waste produced / stored and disposed of (check hazardous waste manifests)	every hauling and disposal	quantity of each hazardous waste type stored and disposed	PCO	Farm manager	
		disposal through accredited TSD	✓								Php 3,500 for disposal and hauling costs
		reusing, recycling certain materials (for various construction and maintenance activities)	✓								
c.2 generation of infectious, pathological wastes, carcasses	veterinary activities, infections, outbreaks	carcass disposal through burial in mortality pit	✓								
		pathological / innfectious materials disposed in mortality pit	✓								
D. Air Pollution											
d.1 generation of biogas	anaerobic digestion	capturing through biodigesters and combustion using biogas-fueled engine	✓			record electric meter reading of biogas gensets	daily	kWh produced	biodigester operators	Farm manager	Project cost
d.2 generation of air pollutants	stand-by generator sets (fossil fuel combustion)	operate machineries according to manufacturer's instruction	✓			review inspection and maintenance record	monthly	number and details of machinery issues noted	Farm personnel	Farm manager	Php 11,000 maintenance costs
		regular inspection and preventive maintenance of equipment	✓				every 200 running hours	running hours			
E. Risk of Environmental Degradation											
e.1 (risk of) surface water and groundwater quality degradation, disruption of soil properties, contamination	e.1.1 wastewater collection, transport, treatment, disposal	operates WWTF as prescribed	✓			effluent sampling and testing by an EMB-accredited laboratory	quarterly	effluent quality indicators: BOD, TSS, ammonia, phosphate (must meet standards for Class C effluent)	PCO	Farm manager	Testing fees
		regular inspection and preventive maintenance of WWTF; regular desludging	✓				more frequently during rainy seasons				Php 1,000 maintenance costs
		maintainance of vegetation (filter strips) around lagoons	✓								
		ensures effluents meet EMB standards^	✓								
	e.1.2 sludge management, storage, leachate	drying of sludge and using it as soil amendment	✓			review inspection and maintenance record	monthly	number and details of leak / breach incidents	biodigester operator	PCO	Php 11,000 maintenance costs
		regular inspection and preventive maintenance of drying bed	✓				more frequent during rainy seasons				
		maintainance of vegetation (filter strips) around drying bed	✓								
	e.1.3 pathological wastes, carcass disposal, leachate	established vegetative filter strips around disposal site	✓			review inspection and maintenance record	monthly	number and details of leak / breach incidents	Farm personnel	Farm manager	Landscape maintenance costs
	e.1.4 handling, transport, storage, disposal of hazardous and infectious materials	uses materials according to registered use / manufacturer's instruction	✓			review inspection and maintenance record	weekly	number and details of leak / breach incidents	Farm personnel	PCO, Farm manager	Php 50,000 staff salaries
		use of suitable containers with labels	✓								
		provides secured collection and storage area	✓								
		regular inspection of storage, disposal facilities	✓								
		will make MSDS available on-site of use		✓							Wood shavings and sand used as spill kit
		will develop and observe safety protocols		✓							

		will install appropriate signage, warnings	✓	✓							
		will provide spill kits on storage areas	✓								
		will prepare a contingency response plan		✓							
		will provide adequate training to staff on handling of hazardous materials		✓							
e.2 (risk of) pollution from fugitive biogas	biogas collection, storage, combustion	operates MRF as prescribed	✓			review inspection and maintenance record	monthly	number and details of leak / breach incidents (odor detection)	biodigester operator	PCO	Php 11,000 maintenance costs
		regular inspection (leak test) and preventive maintenance of MRF	✓								
F. Health and Safety – Anaerobic Digester System											
f.1 explosion hazards	biogas collection, storage, combustion	No smoking or hot works in the vicinity of biogas facility	✓			review inspection and maintenance records, incident reports, complaints register	monthly	number and details of explosion, fire incidents	Farm personnel	Farm manager, PCO	Php 11,000 maintenance costs
		Restrict access to biogas facility									
		Place signages									
		Regular maintenance of biogas system									
f.2 asphyxiation	biogas	Buddy system when conducting work	✓			review incident reports	monthly	number and details of asphyxiation, poisoning incidents	Farm personnel	Farm manager, PCO	Php 50,000 staff salaries
		Restrict access to biogas facility									
		Regular maintenance of biogas system									
f.3 chemical hazards	sludge	Use appropriate PPE	✓			review incident reports	monthly	number and details of infection, infestation incidents	Farm personnel	Farm manager, PCO	PPE costs
						review results of health checks	annually				Doctor's fees
G. Health and Safety – General Farm Operations											
f.1 odor - nuisance, discomfort, health issues	f.1.1 pig houses, manure	regular cleaning of pig houses and maintenance of drains	✓						PCO	Farm manager	Php 3,500 for disposal and hauling costs
		maintains existing vegetation	✓								
		provision and use of appropriate PPE	✓								
	f.1.2 WTF, effluent, MRF	gas trapping and combustion through MRF	✓								Php 50,000 for staff salaries
		will ensure adequate retention time of wastewaters in the biodigester is achieved	✓								
		regular inspection and preventive maintenance of WWTF-MRF	✓								
		provision and use of appropriate PPE	✓								PPE costs
	f.1.3 decomposing materials (sludge and organic solids)	ensure sludge pile is well aerated, prevent waterlogging	✓								
		provision and use of appropriate PPE	✓								
	f.1.4 decomposing materials (placental materials and carcasses)	disposal through burial, composting	✓								
		prevent leakage of leachate in disposal sites (see e.1.3)	✓								
		provision and use of appropriate PPE	✓								
f.2 noise - nuisance, discomfort	f.2.1 pigs	Fixed feeding schedule	✓			review complaints register	monthly	number and details of noise complaint	PCO	Farm manager	Feed costs
		provision and use of appropriate PPE	✓								
		Maintains existing vegetation, will plant trees	✓								Php 5,000 for change oil services and general maintenance
	f.2.2 vehicles, machineries	operate equipment, machineries according to manufacturer's instruction	✓								
		regular inspection and preventive maintenance of machineries	✓								
		generator sets are fitted with mufflers	✓								
		provision and use of appropriate PPE	✓								
f.3 dust - nuisance, discomfort, health issues	f.2.1 pig houses, feed handling	limits dust-generating activities during day time, low wind movement (as much as it is practical)	✓			review complaints register	quarterly - more frequent during typhoon (windy) season	number and details of dust complaints	PCO	Farm manager	Php 11,000 maintenance costs
	f.2.2 composting areas, dried compost handling	use of appropriate containers, barriers	✓								
		damping of dried materials	✓								
		limit dust-generating activities during day time and low wind movement (as much as it is practical)	✓								
		provision and use of appropriate PPE	✓								
	f.2.3 vehicles, machineries	limits vehicular speed on unsealed roads	✓								
		operates feedmill in an enclosed area	✓								
		limit dust-generating activities during day time, low wind movement (as much as it is practical)	✓								
		provision and use of appropriate PPE	✓								

f.4 pest and vermin proliferation / infestation - nuisance, health issues	decomposing materials and sources of odors	implement odor control measures (see f.1)	✓			review inspection results records and complaints register	monthly - more frequent during rainy season	number and details of incidents, complaints	Farm personnel	PCO	Php 11,000 maintenance costs
		imlement pest, vermin control measures (use of baits and traps)	✓								Php 4,000 for pesticide
		observes good houskeeping practices	✓								
		regular inspection of farm facilities, surroundings	✓								
f.5 health hazards, (risk of) contracting infectious diseases, sustaining injuries, livestock outbreak	handling, transport, storage of hazardous and infectious materials, movement of carrier pests and vermin, handling of ill pigs	adequate training on handling of hazardous, infectious materials	✓			review incident reports, inspection records and complaints register, results of employees’ regular health checks	monthly	number and details of illness, injury incidents, complaints	PCO	Farm manager	Php 350,000 for staff salaries
		provision and use of appropriate equipment for handling and storage of hazardous and infectious materials	✓								
		enforce, observe biosecurity measures, health and safety protocols	✓								
		observe measures for safe handling of hazardous and infectious materials (see e.1.3 & e.1.4)	✓								
		implement pest and vermin control measures (see f.4)	✓								
		regular inspection of farm facilities, surroundings	✓								
f.6 explosion, fire hazard	biogas collection, storage, combustion	WWTF-MRF constructed with durable materials	✓			review inspection and maintenance records, incident reports, complaints register	monthly	number and details of explosion, fire incidents	PCO	Farm manager	Php 11,000 maintenance costs
		operates WWTF-MRF according to design	✓								
		regular monitoring of pressure within the MRF system	✓								
		regular inspection (leak test) and preventive maintenance of MRF	✓								
		restricts access to MRF	✓								
		prohibits ignition sources (smoking) near MRF	✓								
		will install signage and warnings			✓						
		reporting and recording of explosion, fire incidents			✓						
f.7 drowning hazard	open ponds, lagoons, tanks	restrict access to WTF, install fences			✓	review incident reports	monthly	number and details of drowning incidents	Farm pesronnel	PCO	Signage costs
		install signage and warnings			✓						Construction costs
		reporting and recording of drowning incidents			✓						
f.8 freshwater depletion	pig raising and general farm activities	water conservation strategies			✓	quantify volume of freshwater consumption	monthly	volume of freshwater consumed	Farm pesronnel	Farm manager	
		effluent recycling	✓								
f.9 consumption of non-renewable resource (fossil fuels for power)	pig raising and general farm activities	energy conservation strategies	✓			estimate power consumption from billing for electricity	monthly	kWh consumed	Farm personnel	Farm manager	Php 11,000 maintenance costs
		use of energy-efficient equipment	✓								
		uses electricity generated using biogas	✓								
		pig buildings have concrete walls and roofing, providing efficient insulation against ambient heat	✓								
f.11 (risk of) erosion	rainwater runoff	plant various tree species and vegetation along roads and slopes	✓			review inspection records	monthly - more frequent during rainy season	number and details of erosion incidents	Farm personnel	Farm manager	Landscaping costs

BOD

Biological Oxygen Demand

MSDS

Materials Safety Data Sheet

PCO

Pollution Control Officer

PPE

Personal Protective Equipment

SMR

Self-Monitoring Report

TSD

Treatment, Storage, Disposal

TSS

Total Suspended Solids

2.2.4 Contingency Response

Below is an overview of CPA-28's current preparation and action plan in response to the following:

- a. Fire
 - Fire extinguishers are available at strategic locations around the farm. Pig houses are also equipped with water taps from which water for putting out fire can be sourced.
- b. Earthquake
 - The open grounds at the exterior of the farm are designated as evacuation areas for when an earthquake occurs.
- c. Outbreak
 - In the event of a livestock disease outbreak, quarantine measures are instinctively applied. Movement of humans and animals in and out of the farm is restricted and instructions from the farm's consultant veterinarian are carried out.
- d. Power outage
 - Should there be power interruption, a diesel-fueled standby generator is able to supply the farm's electricity needs, in addition to the biogas genset.
- e. Health emergencies
 - First aid kits are readily available on site for minor injuries. Farm personnel also have access to vehicles which can be used for transporting cases needing more advanced medical care.

In the interim, CPA-28 hereby commits to develop a more comprehensive contingency preparedness and response plan that will address incidents of fire; natural hazards (typhoon, earthquake); outbreak; health emergencies; and environmental emergencies (leaks and spills of wastewaters and hazardous wastes, WWTF-MRF system breakdowns). This plan will be appended in the succeeding version of this ESMP.

2.2.5 Occupational Health and Safety

In addition to the health and safety measures presented in Table 3, CPA-28 will develop a more comprehensive health and safety risk management plan which will deal with general occupational health and safety issues associated with work in the farm. Health complaints and accidents will be recorded in a register and will serve as indicators of the plans effectiveness, together with results of workers' annual health check-ups. This plan will be appended in the succeeding version of this ESMP

2.2.6 Biosecurity

The particulars of the farms' biosecurity protocol will be appended in the succeeding version of this ESMP.

2.3 Monitoring, Reporting and Auditing

The proponent will perform the monitoring plan in Table 3 and conduct regular inspection of its facilities not only for internal purposes but also to satisfy the requirements of the Environmental Management Bureau (EMB) for periodic self-monitoring reports (SMR). In addition, assessments will also be initiated during or immediately after incidents that may have compromised the integrity of the farm's facilities, especially the WWTF-MRF, and caused the release of pollutants in the environment. A registry of such incidents and other environmental emergencies and accidents will be maintained in the farm and its details reported in the SMR.

The SMR will contain the results of audits on the farm's environmental performance in terms of resource utilization, waste management, regulatory compliance, and fulfillment of environmental commitments among others. This document will be tendered to EMB quarterly. LBP-EPMD (Environmental Program and Management Department) will also be provided with copies of this document for reference and review purposes.

The owner and the farm's Pollution Control Officer (PCO), has been tasked to ensure that the farm is compliant with pertinent environmental regulations, including those listed in Table 3, and is performing its environmental commitments, including the implementation of this ESMP.

During the implementation of the CDM Program, LBP-EPMD will conduct monitoring activities in the farm at least twice a year to help the proponent execute, identify gaps in, and improve and update this management plan.

3 SOCIAL DUE DILIGENCE

Below are some of the Proponents efforts to ensure that CPA-28 does not infringe upon the social rights of its employees and the Farm's host community.

3.1 Consultation and Participation

Prior to construction, the Proponent, together with LBP-EPMD, identified the Project's stakeholders who were afterwards invited, through letters and notices, to a consultative meeting for the Project's establishment on February 20, 2014. A total of 41 attendees from various institutions, including local officials and residents of communities near the project site were present during the consultation.

All relevant information, especially those that pertain to the Project's environmental and social impacts, were communicated to the stakeholders during the consultations. Issues and queries raised all satisfactorily addressed by the Proponent and the other presenters.

3.2 Grievance Redress Mechanism

The Farm's manager and PCO are hereby designated to be the main contact person for stakeholders regarding grievances, feedbacks, and queries related to the Project. He is also to be in charge of ensuring that the details of complaints and the actions made to address the same will be recorded truthfully.

Such information shall be part of the regular monitoring report for the Project and will be made available to relevant stakeholders.

Issues not resolved at the Project level (by the Proponent) will be raised to the following third party institutions for arbitration and possible resolution:

- Office of the Barangay Chairman
All complaints shall be initially entertained and attempted to be resolved in the *barangay* where the Farm is situated. The *barangay* concerned will facilitate the negotiation process and LBP-EPMD will ensure that the complainant is properly represented.

- **Municipal Office**
Should no agreement be reached at the *barangay* level, the matter will be elevated to a municipal government office. Depending on the nature of the complaint, grievances may be addressed to the Municipal Health Office, Agriculturist Office, Environment and Natural Resources Office, or any relevant municipal agency.
- **LBP**
LBP through EPMD will take part on the resolution process only after the aggravated party has gone through the previous levels and finds the decisions rendered there unacceptable. EPMD will coordinate with the Proponent to ensure that issues regarding the latter's project are resolved to the best interest of the complainant.

To further ensure the Proponent's accountability, contact details of the Farm's management and LPB-EPMD shall be provided to stakeholders during consultations and through postings at public notice boards (including at the Farm's main gate). For the Project of CPA-28 the following individuals will serve as grievance administrators:

- Prudencio E. Calado III
Head/Assistant Vice President, LBP-EPMD
Telephone No.: (632) 405-7339
Fax No.: (632) 528-8484
- PCO, CPA-28
Telephone No.:
- Farm Manager, CPA-28
Telephone No.:

3.3 Information Disclosure

This ESMP and other relevant information regarding the Project will be published in LANDBANKS's website where it can be readily accessed by the public. Printed copies of this document will be submitted to DENR-EMB Region 12 and will also be available in Barangay Buayan's office, in LANDBANK's library (1598 M.H. Del Pilar cor Dr. J. Quintos St., Malate, Manila, Philippines), and in World Bank's Infoshop.

3.4 Equal Opportunity

CPA-28 is an equal opportunity employer, not regarding gender, age, disability, and ethnicity in evaluating and hiring potential employees. Presently, the Farm's roster is consisted of 32 males and 3 females (excluding the owners). Most of the male workers are assigned to do manual, physically demanding work such as animal handling and facility maintenance. Female employees are assigned administrative duties as well as in farrowing.

3.5 Resettlement

The Project is located inside the premises owned by CPA-28, a private property. No individual was displaced for nor were there any indigenous peoples affected by the establishment of the Farm and the Project.

3.6 Others

Employees of CPA-28 receive standard basic salary (at the minimum), 13th month pay, sick and vacation leaves, as well as SSS (social security) and HDMF (housing loan) privileges.

4 ESMP REVIEW AND UPDATING

This ESMP shall be reviewed and updated as needed to keep pace with and adapt to changes and developments related to the Project. The Farm's manager and PCO shall initiate and lead this initiative in consultation with relevant Farm personnel and Project partners.

5 INSTITUTIONAL ARRANGEMENTS

5.1 The Proponent

The Proponent, will be responsible in all aspects of the Project, including the implementation of this ESMP. He will shoulder all costs associated with the construction and operation of the Project, internal monitoring activities, and meeting various statutory requirements. Specifically, he shall cause the accomplishment of the following:

- exercise environmental and social due diligence in implementing the Project
- incorporate sound practices in environmental, health, and safety management
- comply with relevant national and local laws and satisfy regulatory obligations
- perform diligent environmental and system monitoring
- prepare and submit on schedule accurate monitoring reports to EMB and LBP
- cooperate with the LBP and other regulatory agencies by providing assistance and correct and relevant information regarding the Project and its environmental performance for reference, review, and monitoring purposes
- promote transparency by maintaining open lines of communication with project stakeholders and giving them access to relevant information
- initiate resolution of conflicts that may arise as a result of the Project's operation
- disseminate all relevant information to stakeholders

The Proponent, in close coordination with LBP, shall implement the Project based on LBP's ESSF and on the agreed activities and timelines stipulated in the MOA and subproject agreement (SPA) between the said entities.

5.2 **LANDBANK**

LBP shall serve as the financial and technical intermediary for the CDM Program of Activity (PoA) under which the Project of CPA-28 is being implemented. It shall provide the Proponent carbon and investment finance assistance for the installation of an anaerobic wastewater treatment facility equipped with a biodigester and methane-fueled power generator. Moreover, it shall act as the entity in charge of project validation and verification activities, and of collation of relevant information and monitoring data for the undertakings mentioned. Specifically, LANDBANK, through EPMD, shall:

- make available financing facilities to the Proponent, subject to existing lending policies of LBP
- coordinate and facilitate communications and transactions between the Proponent and World Bank or other Carbon Buyers, Designated Operational Entity (DOE), and when necessary, with other project partners
- administer the agreements (MOA, SPA) forged between LBP and the Proponent
- provide technical support and relevant trainings to farm owners and personnel in partnership with donors and other institutions
- ensure compliance of the Project and its proponent with the rules governing PoAs and with its commitments in the MOA and SPA
- ensure compliance of the Project and its proponent with relevant standards and regulations and environmental commitments by conducting on-site monitoring and evaluation and desk reviews
- provide assistance to the Proponent in complying with statutory requirements for the Project
- ensure the Project's sustainability by monitoring the long-term implementation of the safeguards specified in this ESMP and its environmental performance in general
- gather, collate, and review pertinent information and documents (including safeguard instruments, reports, and permits and clearances) concerning the Project
- participate in conflict resolution initiated by the Proponent
- prepare and submit monitoring reports to World Bank regularly
- satisfy its obligations under the Emissions Reduction Purchase Agreement (ERPA) between LBP and World Bank

LBP shall assist the Proponent in its implementation of the Project based on LBP's Safeguards Framework and on the agreed activities and timelines stipulated in the MOA and SPA.

5.3 **Department of Environment and Natural Resources**

The Department of Environment and Natural Resources (DENR) is the primary government institution mandated to manage and protect the Philippines' environment and natural resources. It is also the Designated National Authority (DNA) of the CDM Program in the Philippines. As DNA, its main role is to review and endorse PoAs to the United Nations Framework Convention on Climate Change (UNFCCC).

5.3.1 **Environmental Management Bureau**

Through the EMB, DENR sanctions and regulates the activities of the Project by means of various legal instruments. EMB also leads (whether or not as part of an MMT) the periodic compliance and impact monitoring of the Project, including the fulfillment of commitments stated in this ESMP. Prior to construction, EMB was the agency tasked to review and evaluate the environmental soundness of the Project and authorize its establishment through the issuance of an Environmental Compliance Certificate (ECC).

5.4 **World Bank**

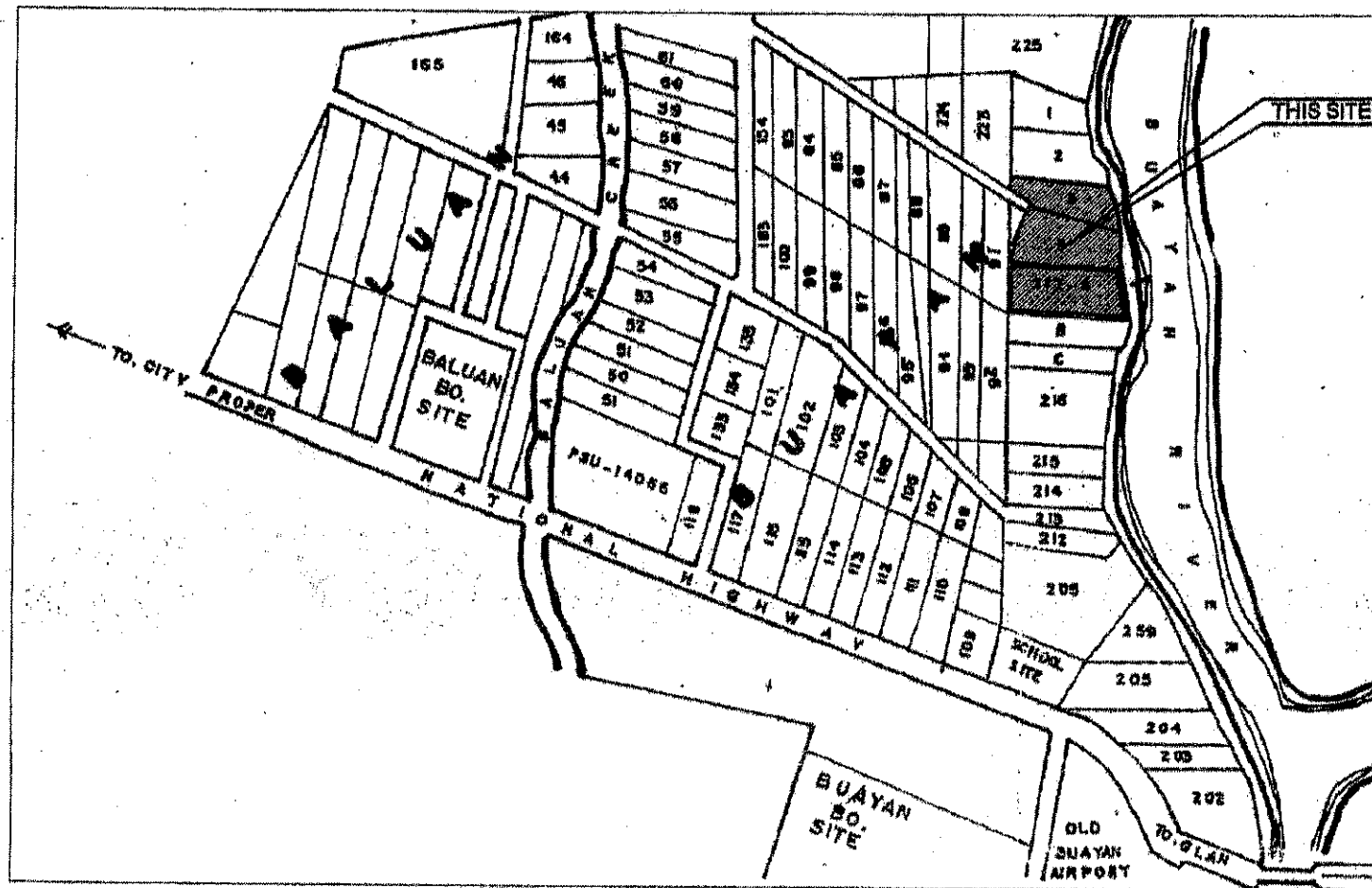
The World Bank is the main Carbon Buyer of the Project, but will also serve as an advisor to LPB in carrying out the latter's responsibilities as the coordinating and managing entity for CDM projects. The Bank will conduct regular monitoring, audits, and appraisal reviews on the Project's safeguard performance against its established policies as well as provide technical guidance to LBP and to the Proponent.

6 SUB-PROJECT ACCOUNTABILITY

In line with Section 3.02 on Sub-Project Development and Operation by the Sub-Project Entity, Item (q) of the Sub-Project Purchase Agreement (SPA) signed by the Farm Management, stating that the Sub-Project Entity (Farm Management) agrees and undertakes to:

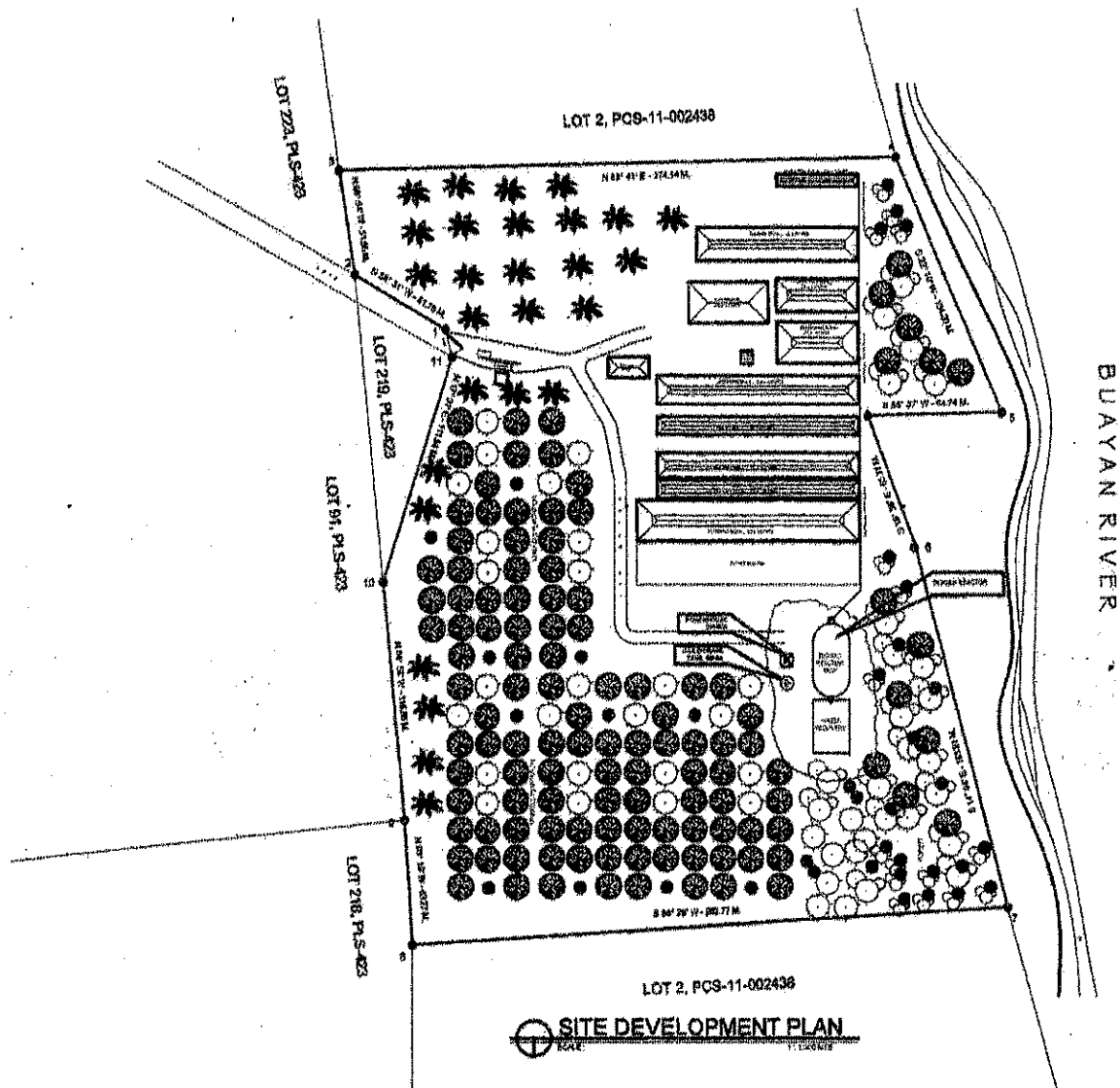
- (q) implement and operate the Sub-Project in compliance with the World bank Operational Policies, including without limitation and as applicable, the Environmental Management Plan, Resettlement Plan, Indigenous Peoples Plan, and any other requirement resulting from the application of the World Bank Operational Policies.

Having signed the SPA, the Farm Management is accountable to comply with the commitments stated in this document.

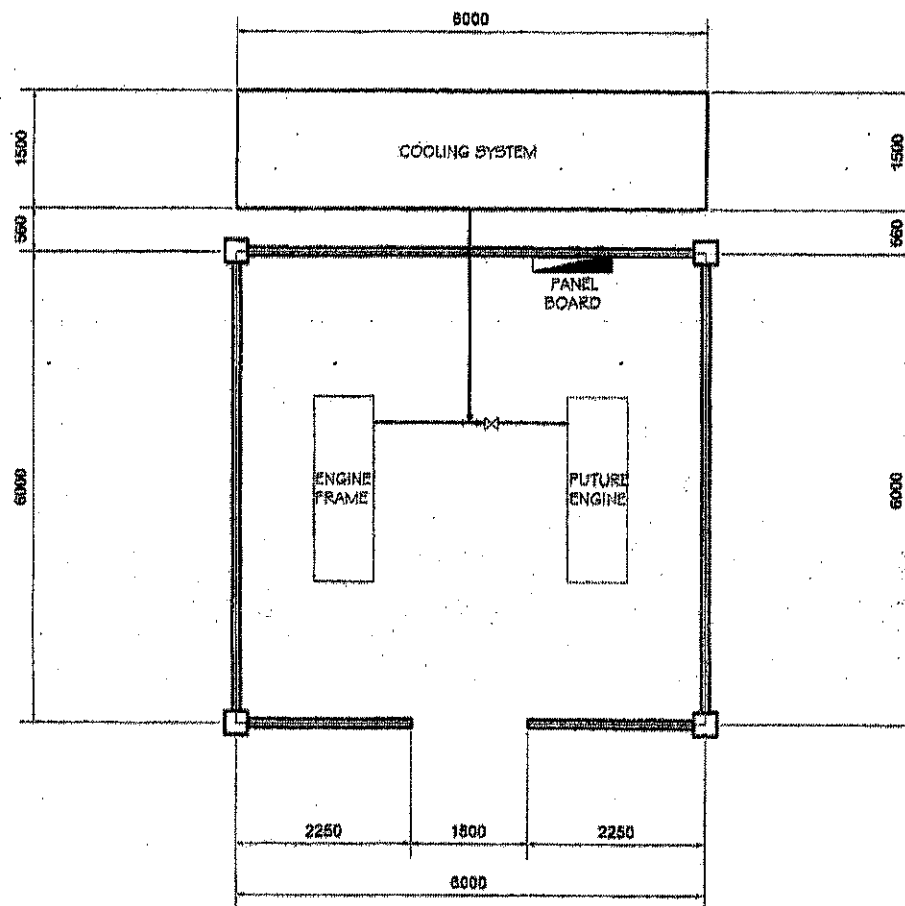


VICINITY MAP
FOUR 1118

FROM THE OFFICE OF: ASHICA ENGINEER AND ARCHITECTS	DESIGN	PROJECT NO.	OWNER :	PROJECT :	CONTENTS :	QUEST NO.
RAMIRO M. ENGLISH		DATE		PROPOSED ONE UNIT BIOGAS REACTOR TANK	1. VICINITY MAP	A
		PTX NO.				
		DATE				
		TO				
CIVIL ENGINEER		ADDRESS : PURCH 1, BUAYAN GENERAL SANTON CITY		ADDRESS : PURCH 1, BUAYAN GENERAL SANTON CITY		03

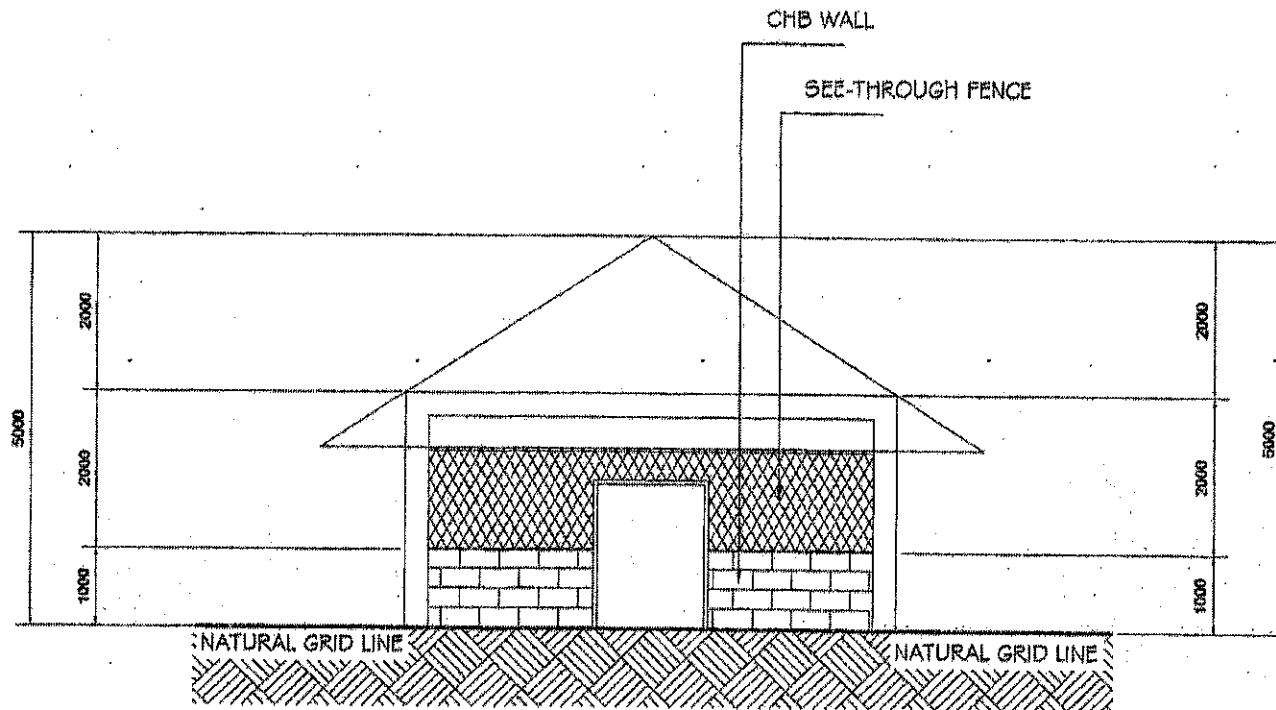


FROM THE OFFICE OF: ENGINEERING AND CONSTRUCTION	SEAL	PRO REG NO. 1	DRAWN	PROJECT	CONTENTS	SHEET NO.
RAMIRO M. ENGLIS		DATE		PROPOSED ONE UNIT BIOGAS REACTOR TANK	1. SITE DEVELOPMENT PLAN	A
CIVIL ENGINEER		PROJ. NO.		ADDRESS: PUNOK 1, BUAYAN GENERAL ANTONIO CITY		01
		DATE		ADDRESS: PUNOK 1, BUAYAN GENERAL ANTONIO CITY		
		TITLE				



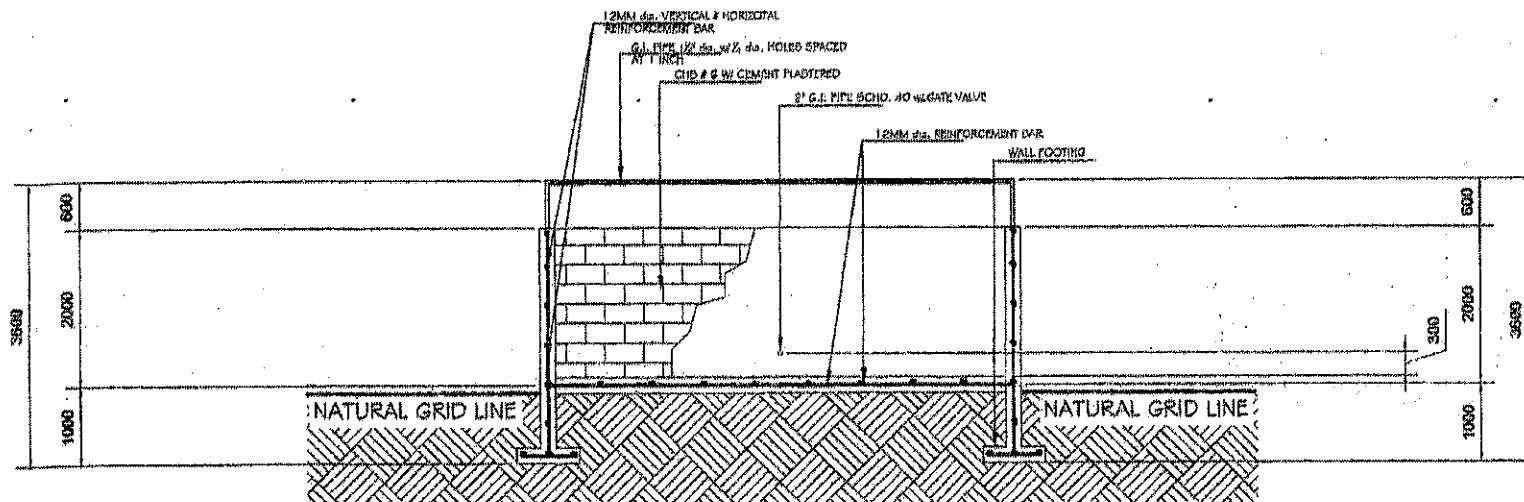
FLOOR PLAN
SCALE 1/8" = 1'-0"

ON THE OFFICE OF APPLICATIONS AND CONSTRUCTION	SEAL	REGISTER NO.	DRAWN	PROJECT	CONTENTS	SHEET NO.
RAMIRO M. ENGLIS		DATE		PROPOSED POWER HOUSE	1. FLOOR PLAN (POWERHOUSE)	A
CIVIL ENGINEER		PTR NO.				01
		DATE				
		TIN	ADDRESS - PUNONG, BAYAN GENERAL BAYAN CITY	ADDRESS - PUNONG, BAYAN GENERAL BAYAN CITY		



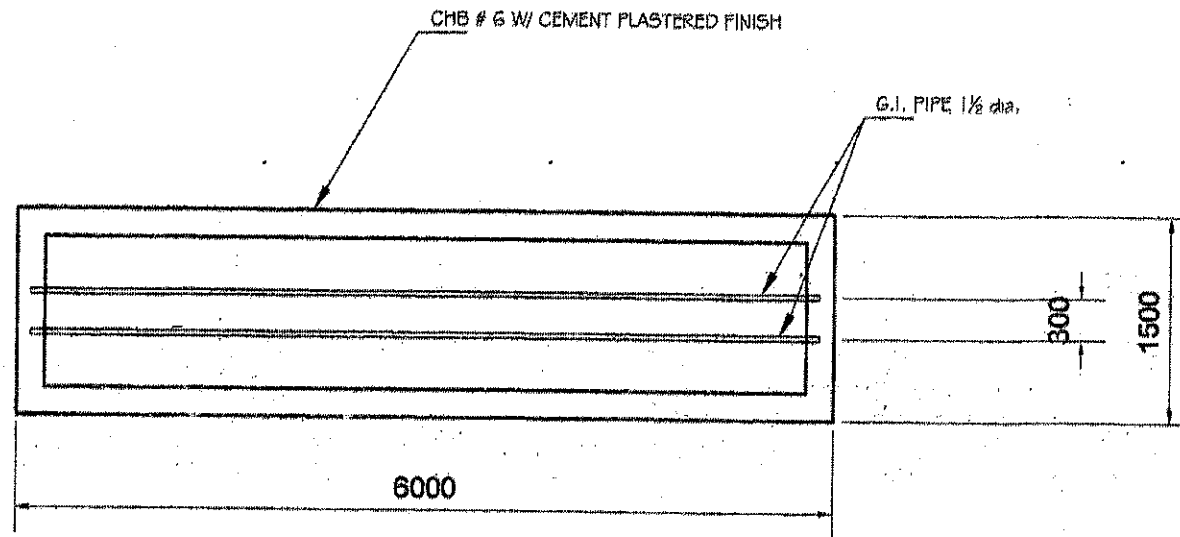
FRONT ELEVATION
SCALE 1/8" = 1'-0"

FROM THE OFFICE OF: ENGINEER AND ARCHITECT	DATE	PROJECT NO.	OWNER	PROJECT	CONTENT	SHEET NO.
RAMIRO M. ENGLIS		DATE		PROPOSED POWER HOUSE	1. FRONT ELEVATION (POWERHOUSE)	A
CIVIL ENGINEER		PIR NO.				02
		DATE				
		SIN	ADDRESS: PUNOK 3 BANAYAN INDUSTRIAL PARK/DAVAO CITY	ADDRESS: PUNOK 3 BANAYAN INDUSTRIAL PARK/DAVAO CITY		



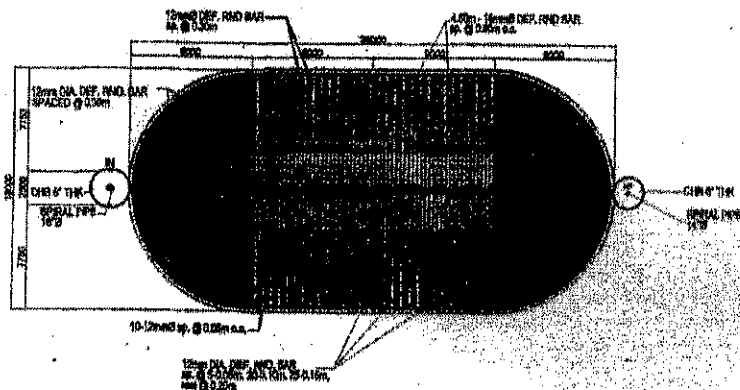
SECTIONAL VIEW
1-1

ON THE OFFICE OF: ARCHITECT/ENGINEER/PLANNING/CONSTRUCTION	REAL	PROJ. REG. NO.	OWNER	PROJECT	CONTRACT	SHEET NO.
RAMIRO M. ENGLIS		DATE		PROPOSED POWER HOUSE	1. SECTIONAL VIEW (COOLING SYSTEM)	S
CIVIL ENGINEER		PER. NO.				02
		DATE				
		TITLE	ADDRESS: PUJON 1, BUKITAN GENERAL BUILDING CITY	ADDRESS: PUJON 1, BUKITAN GENERAL BUILDING CITY		

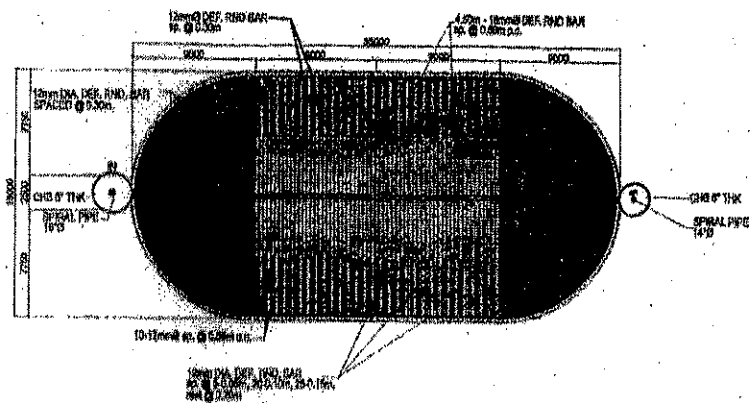


⊕ **PLAN VIEW**
SCALE 1"=60'

DESIGNED BY (SEAL, LICENSE NO. AND SIGNATURE)	DATE	PROJECT NO.	PROJECT NAME	PROJECT ADDRESS	SHEET NO.
RAMIRO M. ENGLIS			PROPOSED POWER HOUSE	PAROL 1, BUNAY GENERAL ANTI-CITY	S
CIVIL ENGINEER					01



SLAB REINFORCEMENT BARS
SCALE 1 : 400 NTS

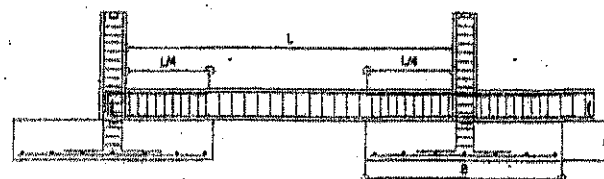
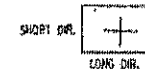


DOME REINFORCEMENT BARS
SCALE 1 : 400 NTS

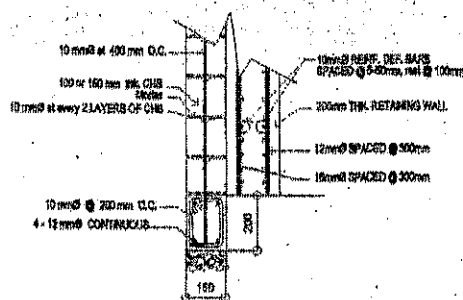
FOOTING SCHEDULE

DESCRIPTION	B (m)	L (m)	I (mm)	LONG DIRECTION		SHORT DIRECTION		REMARKS
				A _{BAR}	A _{TOP}	A _{BAR}	A _{TOP}	
F-1	1.20	1.20	500	7-18#		7-18#		ISOLATED
F-2	1.00	1.00	300	5-18#		5-18#		ISOLATED

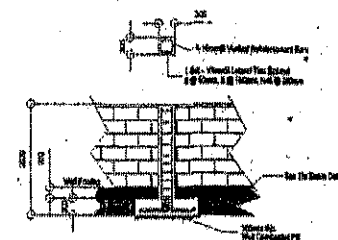
- NOTE:
1. USE GRADE 40 REBARS
 2. USE 3000 PSI CONCRETE
 3. BOTTOM OF F.T.G. IS 1.0 M FROM NATURAL GROUND LEVEL (VERIFY NATURAL SOIL CONDITION)
 4. HI. OF WATER RECOVERY FROM THE HGL IS 2.0M



TYPICAL FOOTING TIE BEAM DETAIL
SCALE NTS



WALL FOOTING AND RETAINING WALL DETAIL
SCALE NTS



TYPICAL "F/C1" DETAIL
SCALE NTS

FROM THE OFFICE OF : SONICA ENGINEERING AND CONSTRUCTION	NSAL	PROJ. NO. 1	OWNER : 1	PROJECT : 1	CONTENTS
CRYSTAL NOYBATERNA		DATE : 1		PROPOSED ONE UNIT BIOGAS REACTOR TANK	SLAB REINFORCEMENT BARS DOME REINFORCEMENT BARS
		PTN. NO. 1			
		DATE : 1			

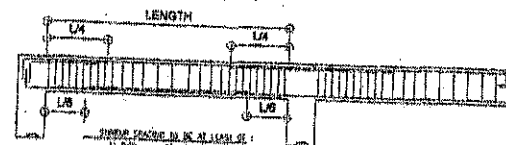
GIRDER AND BEAM SCHEDULE

MARK	B (mm)	H (mm)	STEEL REINFORCEMENT			WEB BAR	STIRRUP
			LEFT SUPPORT	MIDSPAN	RIGHT SUPPORT		
SECOND FLOOR BEAM							
B	101.60	152.40	TOP 2-16 mm 2-16 mm	2-16 mm 2-16 mm	2-16 mm 2-16 mm	10 mm	500, 10160 RESID @ 200 TO MIDSPAN
CB	101.60	152.40	TOP 2-16 mm 2-16 mm	2-16 mm 2-16 mm	2-16 mm 2-16 mm		
LB	152.40	152.40	BOTTOM 2-16 mm 2-16 mm	2-16 mm 2-16 mm	2-16 mm 2-16 mm	10 mm	500, 10160 RESID @ 200 TO MIDSPAN
FOOTING TIE BEAM							
FTB	150	200	2-12 mm 2-12 mm	2-12 mm 2-12 mm	2-12 mm 2-12 mm	10 mm	SPACED AT 200

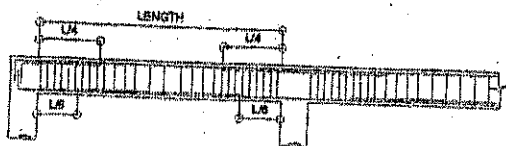
NOTE:

AT THE SUPPORT OF ADJACENT BEAMS HAVING DIFFERENT NUMBER OF REINFORCING BARS, THE GREATER NUMBER SHALL GOVERN (REF.). READ DRAWING FROM LEFT TO RIGHT AND FROM BOTTOM TO TOP.

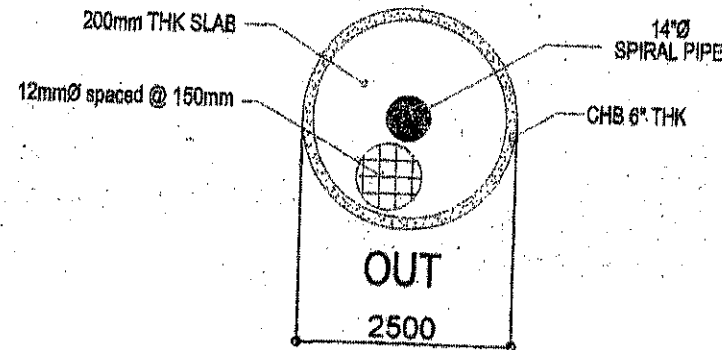
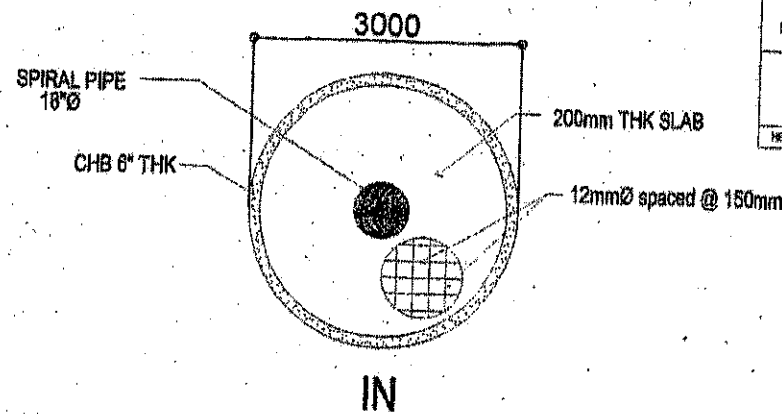
A.) USE GRADE 40 REBARS
 B.) USE 3000 PSI CONCRETE



STIRRUPS REQUIREMENT
 SCALE: NTS



TYPICAL BEAM DETAIL
 SCALE: NTS



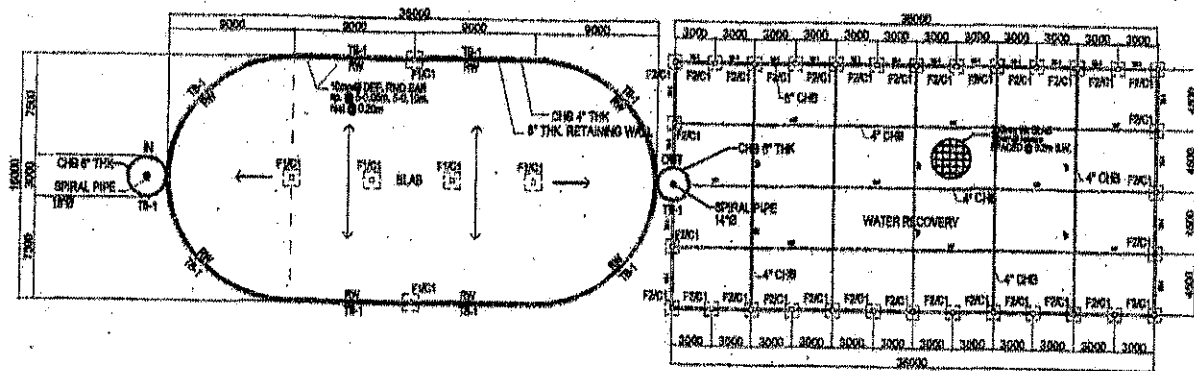
TYPICAL IN AND OUT DETAIL
 SCALE: NTS

IN THE OFFICE OF : BENIGNO ENGINEERING AND CONSTRUCTION		SEAL	PRO REG. NO. :	OWNER :	PROJECT :	CONTENTS :
CRYSTAL JOY BATERNA						

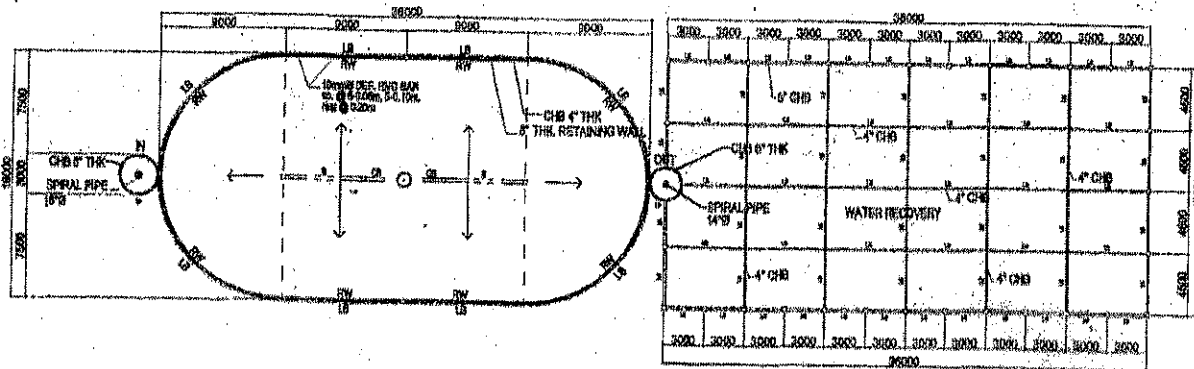
REPUBLIC OF THE PHILIPPINES
DPWH - OGC

RECOMMENDING AUTHORITY

HEAD BUILDING OFFICE



FOUNDATION PLAN
SCALE 1 : 400 MTRS.



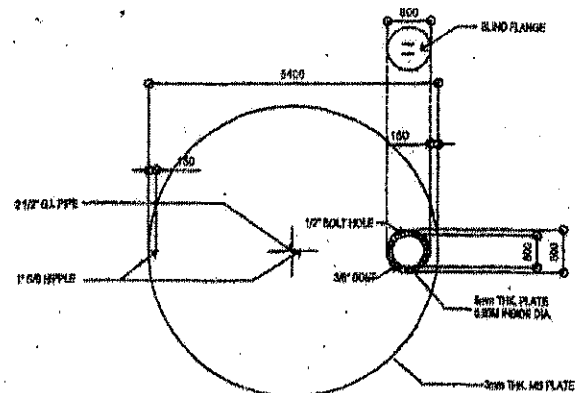
DOMES FRAMING PLAN
SCALE 1 : 400 MTRS.

FROM THE OFFICE OF : ENGINEERING AND CONSTRUCTION	SEAL	PRG REG. NO. :	OWNER :	PROJECT :	CONTENTS :
CRYSTAL BATERNA		DATE :		PROPOSED ONE UNIT BIOGAS REACTOR TANK	FOUNDATION PLAN
CIVIL ENGINEER		PTR. NO. :			DOMES FRAMING PLAN
		DATE :	ADDRESS : BRGY. CALIMPANG GENERAL SANTOS CITY	ADDRESS : LORENZO STOK FARM	
		TH :			



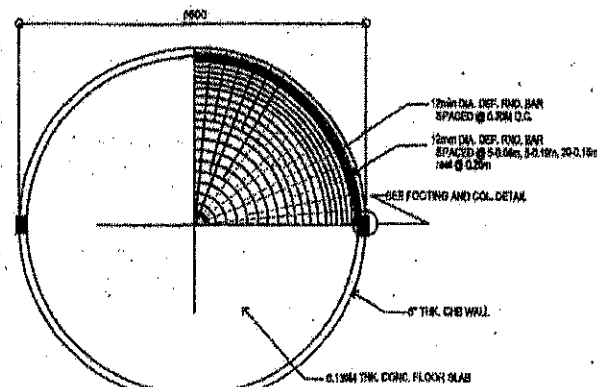
 **PERSPECTIVE VIEW**
N

FROM THE OFFICE OF: SENIOR ENGINEER AND CONSTRUCTION	REV.	PROJ. NO.	DATE	PROJECT	CONTENTS
RAMIRO M. ENGLIS		DATE		PROPOSED ONE UNIT BIOGAS REACTOR TANK	1. PERSPECTIVE VIEW
		DATE			
		DATE			
CIVIL ENGINEER		DATE		ADDRESS - PURON 1, BUNYAN CANTON, SANTIAGO CITY	



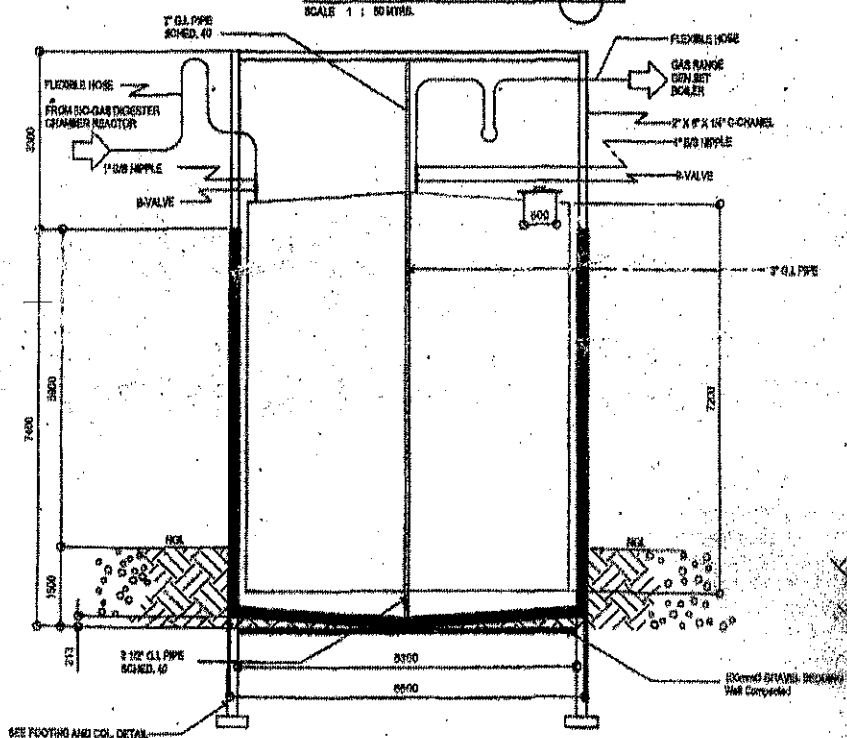
GAS STORAGE STEEL TANK DETAIL B

SCALE 1 : 50 MTRS.



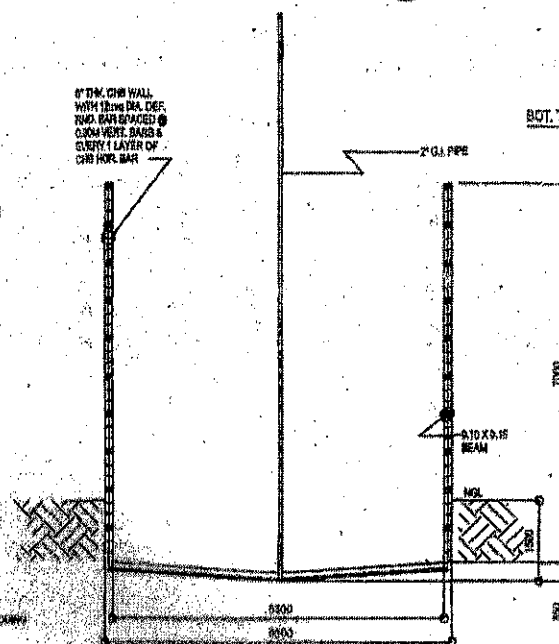
CONCRETE TANK DETAIL C

SCALE 1 : 50 MTRS.



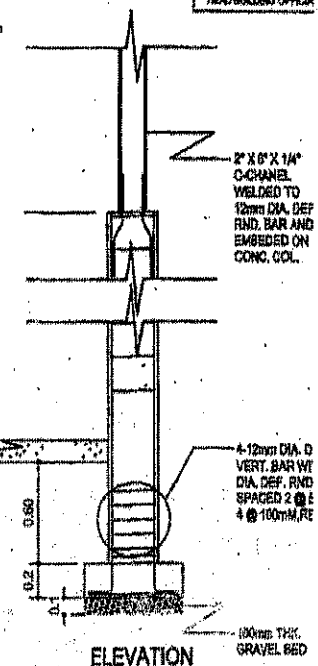
SECTIONAL ELEVATION A

SCALE 1 : 50 MTRS.

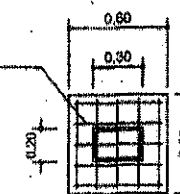


CONCRETE TANK DETAIL D

SCALE 1 : 50 MTRS.



ELEVATION

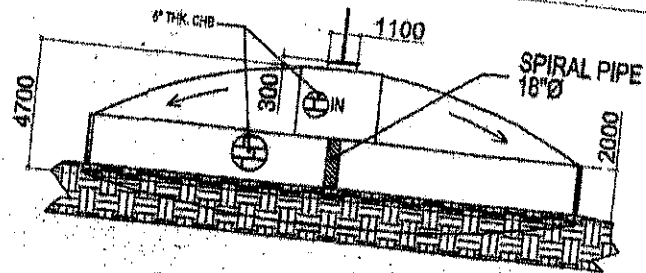


PLAN

DETAIL OF FOOTING AND COL.

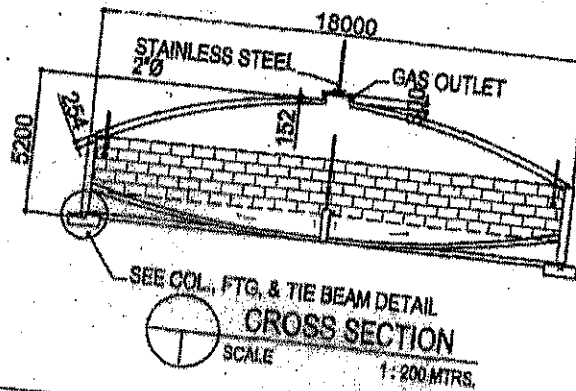
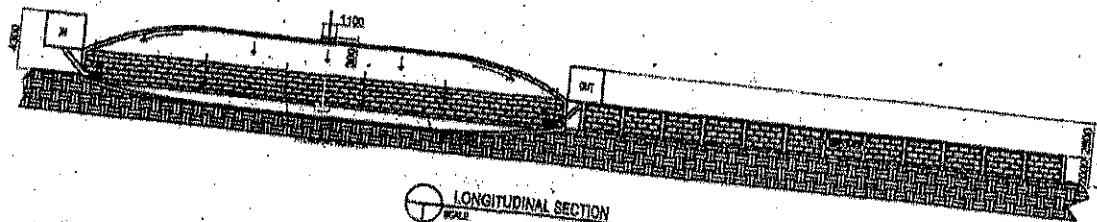
SCALE 1 : 20 MTRS.

FROM THE OFFICE OF : GENRAL ENGINEERING AND CONSTRUCTION	SEAL	PRO. REG. NO. :	OWNER :	PROJECT :	CONTENTS :
CRYSTAL JOY BATENA		DATE :	ENGR. VIRGILIO LORENZO SR.	MICROBIOD METHANE TANK	GAS STORAGE STEEL TANK DETAIL - C CONCRETE TANK DETAIL - D SECTIONAL ELEVATION CONCRETE TANK DETAIL - D
FOR CHECKED		PTR. NO. :			
		DATE :			



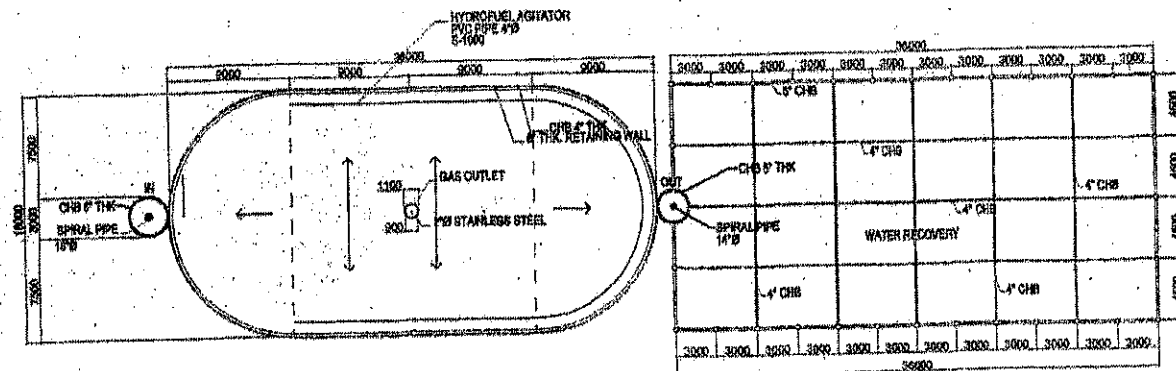
LEFT SIDE ELEVATION
SCALE 1:200 MTRS.

REPUBLIC OF
DPWH - C
RECOMMEND
HEAD BUILDING OF

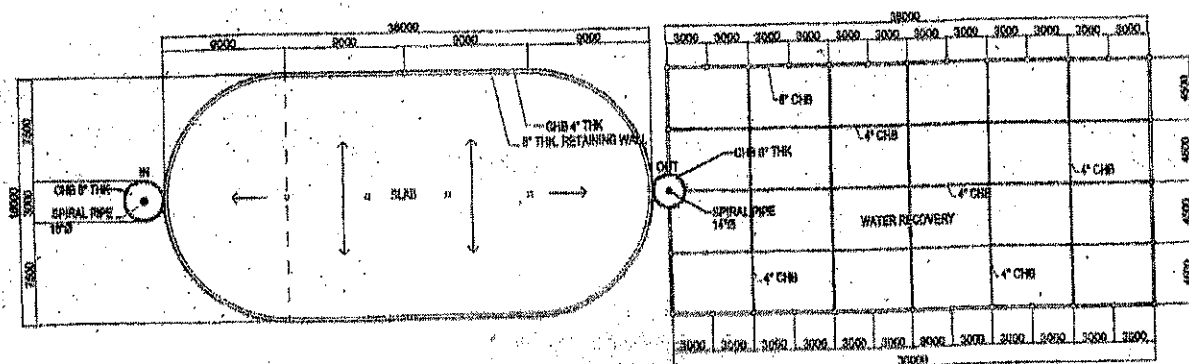


CROSS SECTION
SCALE 1:200 MTRS.

FROM THE OFFICE OF : RESCUE ENGINEERING AND CONSTRUCTION		SEAL	PRO REG. NO.	OWNER	PROJECT	CONTENTS
CRYSTALINO BATERRA			DATE		PROPOSED UREA URT BIOGAS REACTOR TANK	LEFT SIDE ELEVATION LONGITUDINAL SECTION CROSS SECTION
CIVIL ENGINEER			PIR. NO.			
			DATE			
			TIN	ADDRESS : BRGY. CALUMPANG GENERAL SANTOS CITY	ADDRESS : LOMBAYAN ARAK TOWN	



TOP VIEW
SCALE 1 : 400 MTRB.



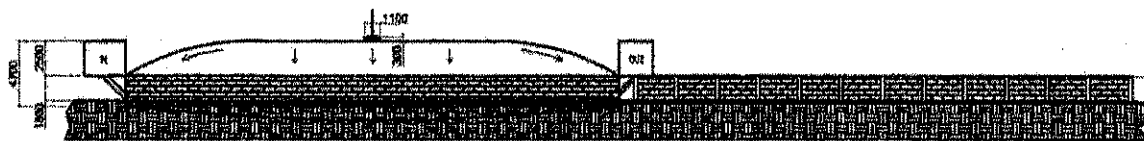
FOUNDATION PLAN
SCALE 1" = 400' APPROX.

FROM THE OFFICE OF : SENIOR ENGINEERING AND CONSTRUCTION	SEAL	PROJ. REQ. NO. : 1	OWNER :	PROJECT :	CONTENTS :
CRYSTAL JOY BATERNA		DATE :		PROPOSED ONE UNIT BIOGAS REACTOR TANK	TOP VIEW FLOOR PLAN
CIVIL ENGINEER		PTR. NO. : 1			
		DATE :	ADDRESSES : BRGY. CALIMPAHAS GENERAL, BANTOG CITY	ADDRESS : LORRENZO STOCK TANK	
		TIN :			

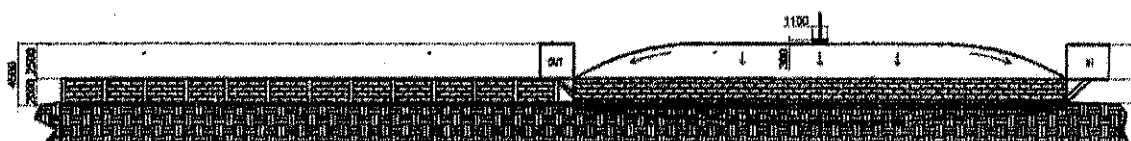
REPUBLIC OF THE PHILIPPINES
DPWH - OBO

RECOMMENDING APPROVAL

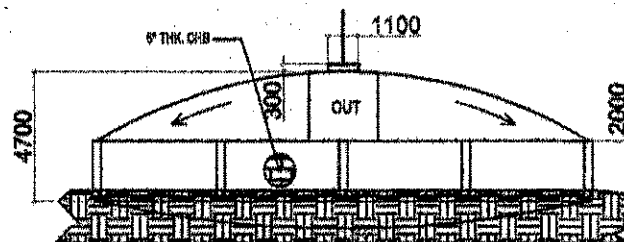
HEAD BUILDING OFFICIAL DATE



FRONT ELEVATION
SCALE 1:400 MTRS.



REAR ELEVATION
SCALE 1:400 MTRS.



RIGHT SIDE ELEVATION
SCALE 1:200 MTRS.

OFFICE OF : SENICA ENGINEERING AND CONSTRUCTION	SEAL	PRO REG. NO. :	OWNER :	PROMOTY :	CONTENTS:	SHEET NO.:
RAMIRO M. ENGLIS		DATE : PTR. NO. : DATE : TN :		PROPOSED ONE UNIT BIOGAS REACTOR TANK	FRONT ELEVATION REAR ELEVATION RIGHT SIDE ELEVATION	A 2
CIVIL ENGINEER			ADDRESS : PUKOK 1, BUAYAN GENERAL SANTOS CITY	ADDRESS : PUKOK 1, BUAYAN GENERAL SANTOS CITY		

Appendix B. Health and Safety Risks Management Plan of CPA-28

Hazard	Possible Harm	Source / Cause	Prevention / Minimization	Person Responsible
physical				
noise	discomfort, hearing damage	pig squeals	<ul style="list-style-type: none"> - pigs consistently feed to prevent stress - PPEs (ear protection) - Conventional pig houses prevent pig squeals from being confined to a small area 	Farm Personnel Farm Manager
		running machineries and vehicles	<ul style="list-style-type: none"> - loud equipment located in an area relatively far from normal working areas - install noise-control devices, when applicable - regular equipment inspection and maintenance - signage and warnings - PPEs (ear protection) 	Farm Personnel Farm Manager
vibration	discomfort, ergonomic and nerve injuries, fatigue	running machineries	<ul style="list-style-type: none"> - position vibration-producing equipment in enclosed areas - install shock absorber - ensure all loose equipment are securely placed - regular equipment inspection and maintenance - signage and warnings - rotating work schedule 	Farm Manager
electricity	shock, electrocution, burns	faulty machineries and power lines	<ul style="list-style-type: none"> - get services of a licensed electrician - consult equipment manual - regular equipment inspection and maintenance 	Farm Manager Farm Personnel
		improper use (or servicing) of electrical equipment	<ul style="list-style-type: none"> - restrict access to equipment (fencing) - signage and warnings - train staff (consult equipment manual) - ensure electricians are provided with proper PPEs for working with electrical equipment (insulated gloves, boots, etc.) 	Electrician
heat	burns	running machineries (hot surfaces, vapors, liquids)	<ul style="list-style-type: none"> - use insulation where possible - signage and warnings - ensure workers wear proper PPE such as long sleeved shirts. 	Farm Manager
	discomfort, heat exhaustion, heat stroke	adverse hot weather working in enclosed spaces with limited ventilation	<ul style="list-style-type: none"> - adequate hydration and rest breaks 	Farm Manager
dust	irritation, respiratory distress / diseases	Feeds	<ul style="list-style-type: none"> - open-sided sheds - spray amounts of water during feeding to limit the dissipation of small feed particles and dust; - calm work pacing to avoid exciting the pigs - thorough cleaning of indoor spaces - PPEs (mask) 	Farm Personnel
		dried sludge		
		Compost		
poor lighting	eye strain, can't see hazards	unlit / inadequately lit areas	<ul style="list-style-type: none"> - install light sources - carry portable light sources - conduct majority of work during the daytime 	Farm Personnel
chemical				
harmful gases, dust, vapors (inhalation)	discomfort (odor), asphyxiation, poisoning, respiratory distress / diseases	degrading organic wastes	<ul style="list-style-type: none"> - measures for odor control (see Table 5) - signage and warning (entrance to confined spaces) - train staff (handling hazardous substances and wastes and working in confined spaces; review MSDS / product information sheets) - PPEs (mask) - ensure first aid kits are readily available 	Farm Manager
		hazardous substances (cleaning and pest control chemicals, veterinary medicines, fuels, hazardous wastes, etc.)		
		fuel burning (machineries, vehicles)	<ul style="list-style-type: none"> - air pollution control device - regular equipment inspection and maintenance 	Farm Manager PCO
		fugitive gases	<ul style="list-style-type: none"> - regular inspection and maintenance of MRF 	Farm Personnel
hazardous substances (contact, ingestion)	irritation, burns, poisoning, skin problems	hazardous substances (cleaning and pest control chemicals, veterinary medicines, fuels, hazardous wastes, etc.)	<ul style="list-style-type: none"> - proper labelling, containers, and storage - restrict access to chemical and hazardous waste storage - train staff (handling hazardous substances and wastes; review MSDS / product information sheets) - only competent staff should administer veterinary medicines - regular inspection and equipment maintenance - ensure first aid kits are readily available 	Farm Manager PCO Farm Personnel

			<ul style="list-style-type: none">- PPEs (gloves, eye glasses)	
		wastewaters	<ul style="list-style-type: none">- regular inspection and maintenance of MRF- PPEs (gloves, goggles, boots)	
biological				
pathogens / infectious agents, toxins and other products	various infectious diseases, parasites, irritation	pathological materials / tissues	<ul style="list-style-type: none">- proper disposal of animal and veterinary wastes (see Table 5)- quarantine measures- improve ventilation- good housekeeping practices (disinfection)- practice hygienic practices (especially hand hygiene)- workers' regular health examination- train staff (animal handling, proper waste handling and disposal)- PPEs	Farm Personnel
		sick animals		PCO
		animal excretions and fluids		
		manure (wastewaters)		
		sludge		
		veterinary wastes (especially sharps)		
		potential disease carriers (objects, people, dust)		
	insects, pests, vermin	<ul style="list-style-type: none">- proper disposal of odorous wastes (see Table 5)- good housekeeping practices- pest control	Farm Personnel	
ergonomic				
ergonomic stress	ergonomic injuries	repetitive actions, forceful exertions, sustained awkward posture	<ul style="list-style-type: none">- purchase / design equipment with ergonomic features- use aid of appropriate equipment- train staff (proper techniques and postures)- buddy system- job rotation / adequate rest (in between tasks)	Farm Manager Farm Personnel
		improper use of equipment	<ul style="list-style-type: none">- train staff (consult manuals)	Farm Manager
		use of faulty equipment	<ul style="list-style-type: none">- repair or replace equipment	Farm Manager
other accidents and contingencies				
slips, trips, falls	injuries, wounds, contusions	spills (slips)	<ul style="list-style-type: none">- daily safety briefings and regular trainings- barricading of work areas- PPEs	Farm Personnel
		various objects, debris (trips)		
		heights, slips (falls)		
	drowning	open lagoons and biodigester	<ul style="list-style-type: none">- Barricading of said areas- signage and warnings- ropes in/near lagoons (for rescuing)	Farm Manager Farm Personnel
entanglement	injuries, wounds, strangulation	machineries	<ul style="list-style-type: none">- install equipment safeguards- tie back long hair- wear long sleeve shirts- avoid wearing loose-fitting clothes and personal accessories- regular equipment inspection and maintenance	Farm Manager Farm Personnel
blows, punctures	injuries, wounds, contusions	pig handling	<ul style="list-style-type: none">- animal restraints- ensure enough space to maneuver- train staff (animal handling techniques)- wear appropriate PPE (boots, gloves etc)	Farm Personnel Farm Manager
sharps	sharps injuries, wounds	veterinary activities, waste handling	<ul style="list-style-type: none">- train staff (proper waste handling and disposal)- PPEs (gloves, goggles)	Farm Manager
lack of oxygen / harmful gases	suffocation, poisoning	confined spaces (power house, manure pits, biodigester, enclosed pens and other chambers)	<ul style="list-style-type: none">- signage and warnings- 'buddy system'- train staff (on protocol and rescue plan)- consider the purchase of gas monitoring equipment	Farm Manager
fires	Burns	faulty electrical systems, explosions, fugitive gases, accidental ignition	<ul style="list-style-type: none">- comply with requirements and regulations of fire authorities- provide adequate and proper (multipurpose) fire protection equipment- designate smoking areas away from digester, gas tanks, and electrical equipment and storage of combustible materials (compost, sludge, chemicals)- restrict access to MRF (fencing)- prohibit smoking and use of cellphones around MRF and gas storage facilities- regular clearing of vegetation near farm structures- signage and warnings- train staff (on contingency plan and proper equipment use)- regular inspection and maintenance of electrical systems and equipment	Farm Manager Farm Personnel
Blast	blast injuries	excessive pressure in biodigester, fugitive gases, contained gases in confined spaces, fires	<ul style="list-style-type: none">- keep sources of heat, including machineries, at a safe distance from MRF- restrict access to MRF (fencing)- prohibit smoking and use of cellphones around MRF	Farm Manager Farm Personnel


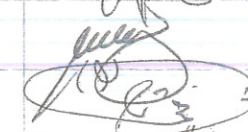
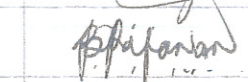


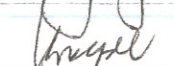
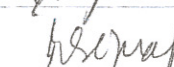
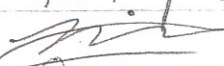

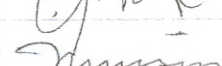
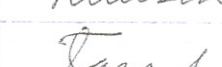
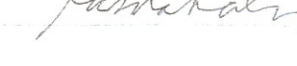
			<div>and gas storage facilities</div> <div><div>- regular inspection and maintenance of MRF</div><div>- signage and warnings</div><div>- consider the purchase of gas monitoring equipment</div></div>	
hazardous substances (contact, ingestion)	irritation, burns, poisoning, skin problems	hazardous substances (cleaning and pest control chemicals, veterinary medicines, fuels, hazardous wastes, etc.)	<div><div>- proper labeling, containers, and storage</div><div>- restrict access to chemical and hazardous waste storage</div><div>- train staff (handling hazardous substances and wastes; review MSDS / product information sheets)</div><div>- only competent staff should administer veterinary medicines</div><div>- ensure first aid kits are readily available</div><div>- PPEs (gloves, eye glasses)</div></div>	Farm Manager PCO
biological				
pathogens / infectious agents, toxins and other products	various infectious diseases, parasites, irritation	pathological materials / tissues	<div><div>- proper disposal of animal and veterinary wastes (see Table 5)</div><div>- quarantine measures</div><div>- good housekeeping practices (disinfection)</div><div>- practice hygienic practices (especially hand hygiene)</div><div>- workers’ regular health examination</div><div>- train staff (animal handling, proper waste handling and disposal)</div><div>- PPEs (gloves, etc)</div></div>	Veterinarians PCO
		sick animals		
		animal excretions and fluids		
		manure (wastewaters)		
		Sludge		
		veterinary wastes (especially sharps)		
		potential disease carriers (objects, people, dust)	<div><div>- proper disposal of odorous wastes (see Table 5)</div><div>- good housekeeping practices</div><div>- keep an acceptable number of cats at the farm</div><div>- pest control</div></div>	Farm Personnel PCO
insects, pests, vermin				
ergonomic				
ergonomic stress	ergonomic injuries	repetitive actions, forceful exertions, sustained awkward posture	<div><div>- use aid of appropriate equipment for lifting/moving heavy objects</div><div>- use of proper lifting techniques</div><div>- buddy system</div><div>- job rotation / adequate rest (in between tasks)</div></div>	Farm Manager Farm Personnel
		improper use of equipment	<div><div>- train staff (consult manuals)</div></div>	Farm Manager Farm Personnel
		use of faulty equipment	<div><div>- repair or replace equipment</div></div>	Farm Manager Farm Personnel
other accidents and contingencies				
slips, trips, falls	injuries, wounds, contusions	spills (slips)	<div><div>- proper maintenance of walkways</div><div>- daily safety briefings and regular trainings</div><div>- barricading of work areas</div><div>- PPEs</div></div>	Farm Manager Farm Personnel
		various objects, debris (trips)		
		heights, slips (falls)		
entanglement	injuries, wounds, strangulation	machineries	<div><div>- install machine guards</div><div>- tie back long hair</div><div>- wear long sleeve shirts</div><div>- avoid wearing loose-fitting clothes and personal accessories</div><div>- regular equipment inspection and maintenance</div></div>	Farm Manager Farm Personnel
blows, punctures	injuries, wounds, contusions	pig handling	<div><div>- animal restraints</div><div>- ensure enough space to maneuver</div><div>- train staff (animal handling techniques)</div><div>- wear appropriate PPE (boots, gloves etc)</div></div>	Farm Personnel
Sharps	sharps injuries, wounds	veterinary activities, waste handling	<div><div>- ensure only trained personnel conduct veterinary activities</div><div>- PPEs (gloves, goggles)</div></div>	Farm Manager PCO

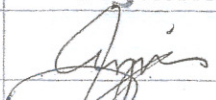

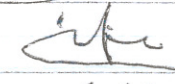
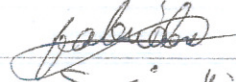

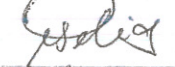


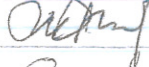
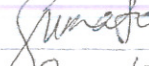
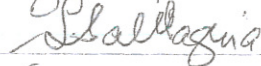



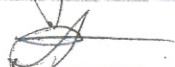



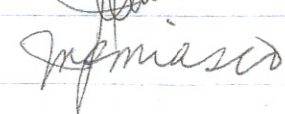
fires	Burns	faulty electrical systems, explosions, fugitive gases, accidental ignition	<ul style="list-style-type: none"> - comply with requirements and regulations of fire authorities - provide adequate and proper (multipurpose) fire protection equipment - designate smoking areas away from digester, gas tanks, and electrical equipment and storage of combustible materials (compost, sludge, chemicals)) - regular clearing of vegetation near farm structures - signage and warnings - train staff (on contingency plan and proper equipment use) - regular inspection and maintenance of electrical systems and equipment 	Farm Manager Farm Personnel
blast	blast injuries	excessive pressure in biodigester, fugitive gases, contained gases in confined spaces, fires	<ul style="list-style-type: none"> - keep sources of heat, including machineries, at a safe distance from biogas facility - prohibit smoking and use of cellphones around biogas system and gas storage facilities - regular inspection and maintenance of MRF - signage and warnings - consider the purchase of gas monitoring equipment 	Farm Manager Farm Personnel

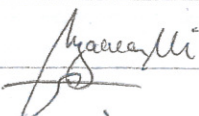
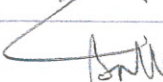
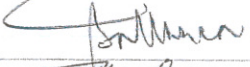
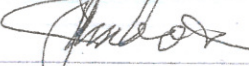
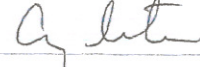


Stakeholder Consultation Clean Development Mechanism (CDM)

"Proposed Methane Recovery & Combustion System (Biogas Project)"

ATTENDANCE SHEET

	Name	Organization/Address	Designation/Position	Signature
1	NAIDA S. DERIS	PRK KAGAWAD / Purok MASIPAG	Committee on SWM	Udara
2	Leticia M. Sta. Iglesia	Ptk. kagawad / Purok Masipag		Ji
3	SALIM W. MATU	PRK. MATATAG	PRK. KAGAWAD	
4	ARTEMIO P. CONZALES	PRK. MASUNURIN	PRK CHAIRMAN	
5	ZACARIA G. PANGULAN	PRK. MATATAG	PRK CHAIRMAN	
6	Bernadette V. Pajanan	PRK Alinan	PRK Kagawad	
7	Lorito A. Pentiche	PRK Maunlad Binyan SR	member	
8	Romeo C. POMPERADA	PURUK 3	CHAIRMAN	
9	Shirley M. Napal	PRK. Magiting	Biogas Utility	
10	REBECCA O. OMAPAS	PURUK MAGAGANA	PURUK CHAIRMAN	
11	Mike T. Algabre	Purok Maunlad	Purok Kagawad	
12	Larry B. Villegas	Prk 01	Transport chairman	
13	MARIETA V. MISSION	Prk Masunurin PRK Kagawad	Biogas Kagawad	
14	Tamela V. Mabalua	Prk Maligaya	Prk Kagawad	

	Name	Organization/Address	Designation/Position	Signature
15	Frank M. Tugiman	Purok Taligaya	Purok Kagawad	
16	LEVI B. YALINZUELA	PRK. MAUNLAD	Purok Kagawad	
17	NESANTO D. MANTO	Purok Masagan	Purok Kagawad	
18	Fe Alariden	Purok I	Chairman	
19	Gema G. Canadon	PRK. Matatag	Treasurer	
20	Elianda Elia	PRK. Matatag	Secretary	
21	Victor E. Tumuk	PRK. Minangas	Kagawad	
22	Vilma S. Panganiban	PRK. Maunlad	Purok Chairman	
23	Manafino Pascual	PRK. Matatag	Purok Kagawad	
24	Nancy C. Majo	PRK. Matatag		
25	Lorra C. Salilaguia	"		
26	Marguerite N. Ligo	PRK. Taligaya		
✓ 27	Beltran J. Otanes	PRK. Masagana	BRGY. Kagawad	
28	Arbiso J. Maraglo	PRK. Marigay		
29	Nelson C. Ogston	PRK. MACITING		
✓ 30	KAG. JUN. SAPAR	PRK. 2	BRGY. KAG.	
31	Conazon A. Pochub	PRK. Maligaya	BRGY. Clerk	
32	Amor H. Onia	PRK. 1	BWA	
33	milagro P. Masaso	maligaya	CHT	

	Name	Organization/Address	Designation/Position	Signature
34	NORSHIERRA G. ALI	Purok 2 Prk. Kagawad - Prk. Kagawad	Lupon Clerk - Prk. Kag. on Sports Social Services	
35	EDRIC C. TUCAUD	CENRO - WMO GSC	ADMIN AID III	
36	Memedus M. Malloran	Bugy. Kagawad - Bugayon	-	
37	Julia O. Gumbao	NONE	NONE	
38	Felomena Rumbio	NONE	NONE	Felomena Rumbio
39	Celestino E. Tolentino	LBP, EPMD	SAMS	
40	PRUDENCIA E. CAJADO II	LBP - EPMD	DM	
41	Shellen Joy C. Cateje	LBP - Genan II	AO	
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STAKEHOLDER CONSULTATION ON THE CLEAN DEVELOPMENT MECHANISM OF THE WASTE-TO-ENERGY SYSTEM

February 20, 2014

I. Attendees

Please see attached attendance sheet

II. Opening of the Consultation Meeting

Lorenzo Stock Farm, in cooperation with LANDBANK and World Bank, conducted a CDM stakeholders meeting last February 20, 2014, from 7:00 am to 12:00 am at ALS Building, Barangay Hall Compound, Buayan, General Santos City. Joy Cabije of LANDBANK GESLC led the the opening prayer and the Philippine national anthem and subsequently Mr. Prudencio E. Calado III, Head of LANDBANK Environmental Program and Management Department started the discussion of CDM.

III. Overview of Climate Change, Kyoto Protocol, Clean Development Mechanism (CDM), & LANDBANK Carbon Finance Support Facility (CFSF)

Mr. Prudy Calado of LANDBANK presented the overview of Climate Change, Kyoto Protocol, CDM & CFSF. Among others, Mr. Calado emphasized that the consultation was conducted as part of the requirements of application to be an eligible project under the CDM. Under the CD , can earn carbon credits or CER by mitigating the emission of methane from pig waste of the establishment and operation of a biogas digester which also improves its existing wastewater management system.

IV. Lorenzo Stock Farms CDM Project Overview

Lorenzo Stock Farm manager Ernesto Capareda introduced Engr. Fabio G. Sanica to discussed the benefits of the biodigester that he designed for l Among the basic features of the new system are the following:

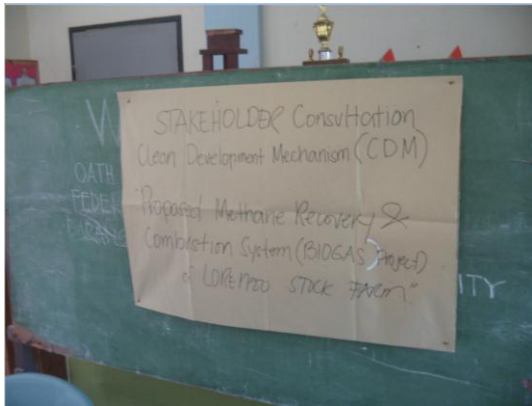
1. Pre-filter
2. Equalization tank
3. Solid waste separator
4. Closed anaerobic digester for 1000 sow level capacity at 30 day retention period.
5. Utilization of the existing 4 lagoons
6. Treated water of the end pond which will be recycled back to the farm for cleaning
7. 280 kw power generation system

V. Environmental Management Plan (EMP)

Mr. Edward Lapong , Associate Professor, Agricultural Engineering Department of MSU, GSC presented wastewater management system wherein the wastewater is treated in four (4) open lagoon system that are interconnected with each other. The project is to replace the existing anaerobic manure management system with an anaerobic digestion and methane recovery and combustion system to be able to

achieve methane recovery and destruction by flaring or utilizing methane to produce electricity. He explained that this project will greatly reduce the odor caused by pig manure in the present system. The barangay council and purok representatives expressed their appreciation to the management in addressing the environmental issues that affects the community. A barangay kagawad inquired if they can also benefit from the technology of a biodigester in their home. They asked the designer if he can help them set up a small digester to provide them with gas for cooking. Engineer Senica said that he will provide the engineering drawing and technology for those who want to build their own digester.

Photos from the Stakeholder's Consultation



**Stakeholder Consultation
Clean Development Mechanism (CDM)**

[Redacted]

PROGRAM

8:00 AM - 9:00 AM ----- Registration

9:00 AM - 9:15 AM ----- Opening Program

- Opening Prayer ----- Ms. Vanessa Jackson
- National Anthem
- Message ----- Mr. Ernesto Capareda
Farm Manager
- Introduction of Participants -- c/o Landbank

9:16 AM - 10:00 AM -- c/o Land Bank

- Climate Change
- Clean Development Mechanism
- Carbon Finance Support facility

10:00 AM - 10:15 AM ----- Snacks

10:16 AM - 11:00 AM ----- C/O Lorenzo Stock Farm

- Biogas Project ----- Engr. Fabio G. Sanica
- Environmental Development Plan & Benefits ----- Edward Lapong
Associate professor Agriculture
Engineering Department, MSU G.S.C

11:00 AM - 11:30 ----- Open Forum

12:00 am ----- Lunch

January 24, 2014

Prudencio E. Calado III
Head, Environmental Program &
Management Department.
Land Bank Plaza 1598,
Malate Manila

Dear Sir :

Warm Greetings!

The Lorenzo Stock Farm, in cooperation with the Land Bank of the Philippines, will conduct a Stakeholder Consultation for the Clean Development Mechanism (CDM) proposed Methane Recovery and Combustion System (Biogas Project). This activity will be conducted on February 20, 2014, 7:00 am - 12:00 noon, at ALS Bldg., Brgy Hall Compound, Buayan, Gen. Santos City.

Key points on CDM and in-depth information on the project, such as Environmental Management Plan and Sustainable Development benefits, will be presented. An open forum will be held after the presentation to allow participants to raise inquiries and clarification on the proposed CDM project.


In this regard, we would like to invite you or a representative from your office to participate in this consultation. Attached is the agenda of the program.

Should you need more information or confirmation of your attendance, please feel free to contact us at tel. no(s). 304-9600 or Cel. 09109977080.

Hope to hear your favorable reply.

Thank you.

Sincerely yours,


NOEL P. LORENZO
President-CEO, Lorenzo Stock Farm

January 24, 2014

Prudencio E. Calado III
Head, Environmental Program &
Management Department.
Land Bank Plaza 1598,
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Appendix D. Site Evacuation Plan

