

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Methane Recovery and Power Generation Project

Ref. No. 5979-0016

CPA-34 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 ACRONYMS

BOD	Biological Oxygen Demand
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CFSF	Carbon Finance Support Facility
CMR	Compliance Monitoring Report
CPA	Component Project Activity
DENR	Department of Environment and Natural Resources
DNA	Designated National Authority
DP	Discharge Permit
ECC	Environmental Compliance Certificate
EMB	Environmental Management Bureau
EPMD	Environmental Program and Management Department
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 of CPA 34.

Scope

Since the Project is a key component of CPA 34's wastewater treatment facility (WWTF), which handles the primary waste the piggery produces (manure), this ESMP will cover the operations of the entire pig farm described herein, only highlighting the management of impacts attributable to or associated with the Project.

1 PROJECT SUMMARY

The Methane Recovery and Power Generation Project of CPA 34 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 34
Business Address: Oroquieta City, Misamis Occidental, Philippines
Project Site: Oroquieta City, Misamis Occidental, Philippines

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

Contact Persons

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1.2 Pig Farm Profile

Farm area: 2.667 ha
Production: Grow-Finish
Housing type: Conventional, tunnel ventilated

Capacity of facility: 2,800 heads
Permitted population: 5,000 heads
Average population: 2,400 heads

Start of operation: 2010
Hours in operation: 12 h / day
Number of employees: 15

CPA 34 is a family corporation engaged in contract growing for San Miguel Foods, Inc., accommodating hogs during the grow-to-finish phase of production. At present, it is able and licensed (as per its Environmental Compliance Certificate) to house a maximum of 5,000 heads.

The Farm is largely powered through a grid by Misamis Occidental I Electric Cooperative, Inc. (MOELCI-I) but is also utilizing electricity from biogas through the Project. Water for its operations is drawn two deep wells within and without its premises. Figure 1 shows the layout and basic facilities of CPA 34.

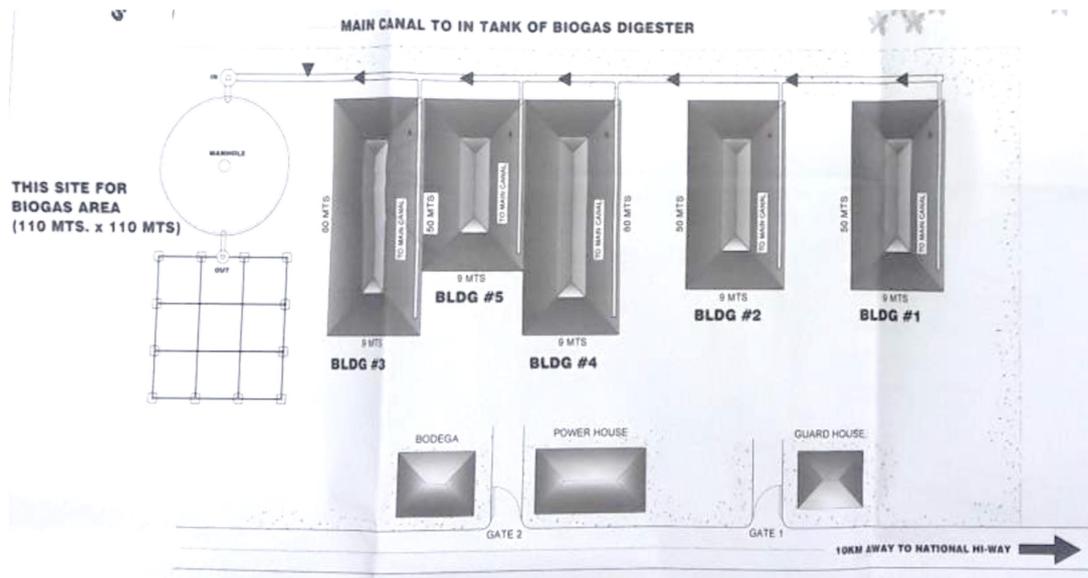


Figure 1. Site layout of CPA 34

1.3 Existing Environmental Conditions

CPA 34 is a 2.667-ha property 430 masl in Oroquieta City, Misamis Occidental. Misamis Occidental is in the island of Mindanao, southern Philippines

1.3.1 Land Classification and Use

The site is presently classified as an agricultural land, with its surroundings mainly used for coconut and banana production (see Fig 2). A number of other livestock and poultry farms are located along the road fronting the Farm leading to the highway.

The Farm has been built and is operating with clearance from Oroquieta City Planning and Development Office. Conversion of the subject property into agro-industrial land is currently ongoing.



Map 1. Map highlighting the Municipality of Santa Barbara and indicating the location of CPA 34 Farm (Image generated using *Google Maps*⁴)

Figure 2. Satellite image of CPA 34 and its vicinity (*Google Maps*)

1.3.3 Climate

Köppen-Geiger system classifies the climate in Oroquieta City as Tropical Rainforest (Af)¹. The city receives rainfall all year round¹. It has an average annual temperature of 27.3 °C and an average precipitation of 2487 mm.¹ Typhoons are barely an occurrence in this area.²

1.3.4 Topography and Soil

The property is on a ridgeline of Mount Malindang and generally slopes towards Ilagan Bay. Within the Farm, the ground gently drops from south / southwest to north / northeast terminating in a shallow gully. Soil in the Farm is classified as clay loam.³

1.3.5 Water Resources

The closest surface water to the site is the Damugo River, flowing through the gully found about 310 m southeast of the property. This river was previously a source of water for the Farm.

On the northwest boundary of the property is a natural ditch through which stormwater flow toward other watercourses leading to Ilagan Bay.

1.3.6 Natural Hazards

The site is not at risk to typhoons and flooding² but is at moderate risk to earthquakes² and landslides³.

1.3.7 People and Communities

There are a few, sporadically situated houses within the 500 m radius of the Farm. Most of the residents here farm crops for a living.

1.4 Project Description

The Project covers the installation and operation of an anaerobic digester system and its ancillary facilities including post-treatment wastewater lagoons and a biogas-fueled electricity generation system. The biodigester and the power generation unit are collectively referred to herein as methane recovery facility (MRF).

1.4.1 Components and Design

CPA 34's wastewater treatment process features three treatment phases:

- *Pre-Treatment*, which involves removal of indigestible materials and 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 provided by the reactor; and
- *Post-Treatment* of the by-products of anaerobic digestion – biogas, effluent, and sludge.

The WWTF mainly consists of a collecting tank, a concrete spherical reactor, and a concrete settling lagoon. The power generation unit is basically two biogas-fueled generator sets. The collecting tank is equipped with a motor that homogenizes the digestate before entering the anaerobic chamber.

Wet digestion is likely employed. Anaerobic process is likely mesophilic, occurring at around 30-40 °C. At this temperature range, the ideal retention time is 30-40 days.

Overall, the anaerobic digester was designed to accommodate wastes generated by the maximum number of pigs the farm could house (5,000 heads) and capture enough biogas to run the Project's facilities with a net energy requirement of zero. The design and layout of the WWTF are in the construction plans in Appendix A. An assessment to determine the facilities operational parameters and outputs will be undertaken. Its results will be presented in the succeeding version of this ESMP.

1.4.2 Operation

Wastewaters from pig houses are collected in underfloor pits that are emptied via pull-plug systems. They are channeled into small collecting tanks where they are temporarily stored prior to being pumped into the main collecting tank. A motor in the main collecting tank ensures that large particles in the influent are broken before entering the biodigester.

Inside the biodigester, wastewaters are continuously stirred by incoming and outgoing wastewaters, thus preventing sedimentation. This consequently results in minimal formation of sludge inside the chamber. Hydraulic pressure created by influent pushes partially treated wastewaters out of the biodigester and into the adjacent settling lagoon where they are stored indefinitely or until drawn to be used as a liquid fertilizer.

Biogas trapped in the biodigester is transferred into the gas collecting tank using a blower. When needed, stored gas drawn by either one of the two generator sets that convert it to electrical energy used in the farm.

The biodigester has been designed to efficiently degrade organic solids in wastewaters. Provision for sludge extraction and management will be established when the need arises.

Figure 3 illustrates the wastewater treatment and power generation process of CPA 34.

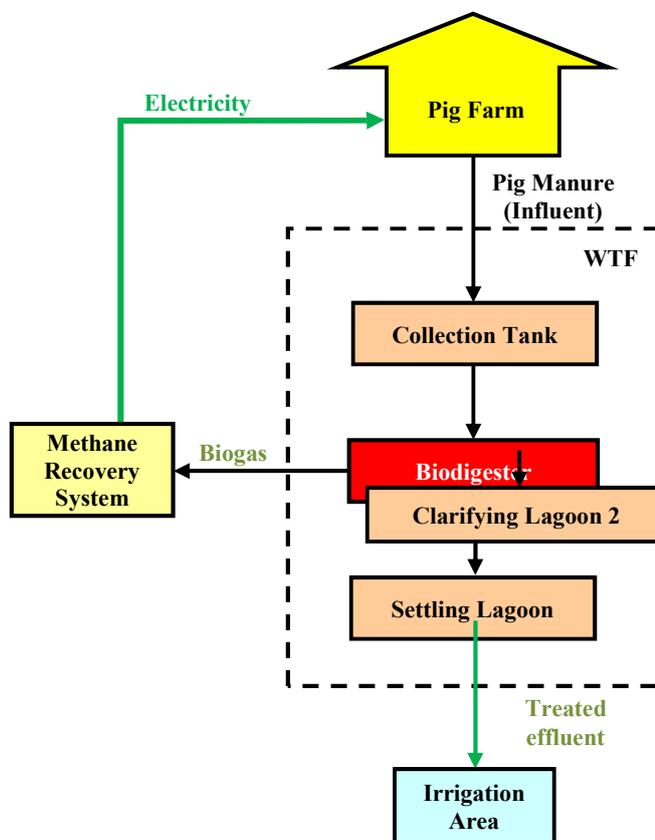


Figure 3. Wastewater treatment and power generation process of CPA 34

2 ENVIRONMENTAL MANAGEMENT

2.1 Impacts

2.1.1 Positive

Environment

The primary treatment of pig wastes of CPA 34 Farm is accomplished mainly through the Project. Anaerobic digestion with the biodigester helps ensure that the Farm's effluents meet regulatory quality standards. Using recycled effluent for irrigation reduce extraction of groundwater and use of synthetic fertilizers on land.

Significant reduction of foul odors emanating from stored effluents has been observed since the operation of the biodigester. This has improved the working condition of workers and the general environment in the Farm for its neighboring communities and livestock.

By providing a mechanism to capture methane and using it as a renewable source of energy, the Project is helping lower the Farm's overall carbon footprint – through preventing release of greenhouse gases into the atmosphere and decreasing its consumption of conventional fuels (for power). With inputs coming from 2,400 hogs (current average), through the Project, CPA 34 is estimated to be capable of reducing greenhouse gas emissions equivalent to 1,000 tCO₂e annually.

Economy

Using biogas-generated electricity lessens the Farm's reliance on the grid, translating to savings for the piggery business. Further savings may also be gained from reusing treated effluent for the Farm's operations.

Having been being registered as a component project activity (CPA) in the CDM Program, CPA 34 has an opportunity to earn monetary incentives by selling carbon credits to World Bank. It may also opt to trade its carbon credits in the wider carbon market after the Program.

Lastly, CPA 34 provides employment opportunities to residents of Oroquieta City and even of nearby provinces. It also generates revenue for the local government.

2.1.2 Negative

Certain aspects of the Pig Farm's 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, especially freshwater / groundwater. These pose inherent risks of variable degrees to environmental quality and natural ecosystems and health and safety of workers, communities, and livestock.

A. Wastewater Generation

Wastewaters saturated with dissolved manure and feed materials are primarily generated from raising livestock through intensive farming methods.

B. Solid Wastes Generation

Pig manure, sludge from wastewater treatment, and carcasses make up the bulk of solid wastes generated in the Farm.

C. Hazardous Wastes Generation

Generation of potentially hazardous wastes mainly result from veterinary activities and use of various chemicals for cleaning and for maintenance of machineries. Biological materials from diseased pigs also pose significant risks to the health of workers and livestock.

D. Generation of Air Pollutants

Emissions from diesel- and biogas-fueled generator sets which supplement the grid for the Farm's power requirements are the main sources of air pollutants in the Farm.

E. Risks to Environmental Quality

- ⌞ Pollution. The inadvertent release to the environment (through breaches and leaks) of the wastes listed above, especially of nutrient-rich materials, may cause serious damage to the quality of affected soil and aquatic resources.

The site is moderately at risk to erosion and landslides. Damage to its WWTF may release significant amount of wastewaters onto the ditch bordering the Farm's property.

- ⌞ Global warming. Large amount of biogas, mostly composed of potent greenhouse gases, are produced during the anaerobic decomposition pig manure and other organic compounds. If allowed to escape to the atmosphere, these gases will contribute to the furthering of the deteriorating effects of global warming. Use of power from the grid consumes non-renewable fuels which generate greenhouse gases when processed for electricity production.
- ⌞ Resource depletion. Intensive farming demands for significant volume of freshwater. Neglectful sourcing and use of water in the Farm could deplete water resources.

F. Health and Safety (Methane Recovery Facility)

Biogas is a mixture of gases produced during anaerobic digestion. It is mainly composed of methane and carbon dioxide, but other gases (nitrogen, hydrogen, hydrogen sulphide, ammonia, etc.) may also be present at lower concentrations.

- ⌞ Fire and Explosion. The MRF presents a major fire and explosion hazard in the farm owing to the high concentrations of biogas (primarily consists of methane which is highly flammable and combustible) that it is designed to capture and process. Risk of explosion is elevated in areas where biogas is compressed for storage.
- ⌞ Asphyxiation and Poisoning. Methane and carbon dioxide are asphyxiants, substances that cause suffocation by displacing oxygen in the ambient air. Furthermore, carbon dioxide and hydrogen sulfide are considered poisonous when inhaled at high concentrations. In the farm, risks of asphyxiation and gas poisoning are high in the areas associated with the MRF and in confined spaces and poorly ventilated areas where fugitive biogas may collect.

- ⌞ Infection and Infestation. Handling and processing of manure, wastewaters, and sludge expose workers to various pathogens and parasites.

G. *Health and Safety (General Operations)*

Various elements and situations in the Farm could compromise the health and safety of workers and livestock. The comfort and convenience of surrounding communities may also be affected by impacts not contained by the Farm's boundaries.

- ⌞ Odor, Noise, Dust. Foul odors are typically emitted from manure drains and storage and unclean pig houses. Loud noises may be produced by pigs (especially during feeding) and farm machines. Dust is generated from handling feeds and other dusty materials and by movement of vehicles on unsealed roads.
- ⌞ Pests and vermin. Pests and vermin are attracted to foul odors and sources of food in the Farm (improperly disposed biodegradable wastes and inadequately contained food and feed materials).
- ⌞ Diseases and Injuries. Livestock, pathological materials, and excretions likely harbor harmful organisms. Various injuries could result from accidents, particularly when handling pigs, operating machineries, and using toxic substances.

2.2 **Due Diligence**

CPA 34 Farm commits to undertake environmental due diligence in its dealings and operations through compliance with relevant regulatory safeguards and implementation of the measures provided in the environmental management and monitoring plan in Table 3 and in the existing and proposed plans presented herein.

2.2.1 **Legal Framework**

The Farm operates in the context of laws prescribing the regulatory safeguards in Tables 1 and 2. Table 1 lists relevant national legal instruments concerned with environmental protection, whereas Table 2 lists permits issued by local government agencies that mainly address health and safety aspects of the Farm and the Project.

Table 1. Environmental documents and statutory requirements regulating the operation of CPA 34 Farm

DOCUMENT	PARTICULARS / STATUS	
Environmental Compliance Certificate (ECC)	Reference No.	ECC-R10-1109-0269
	Issuing Agency	EMB Region 10
	Date of Issuance	September 16, 2011
	Valid Until	- no expiration -
	Conditions	<ul style="list-style-type: none"> ▪ area of operation: 26,670 m² ▪ maximum population: 5,000 heads ▪ creation of EMF
Discharge Permit (DP)	Reference No.	- ongoing application -
	Issuing Agency	EMB Region 10
	Date of Issuance	---
	Valid Until	---
	Conditions	---
Permit to Operate (PTO) Air Pollution Source Control Installations	Reference No.	- on going application -
	Issuing Agency	EMB Region 10
	Date of Issuance	---
	Valid Until	---
	Conditions	For the following equipment: <ul style="list-style-type: none"> - (1 unit) diesel-fueled genset - (2 units) biogas-fueled genset
Water Permit	Reference No.	- For application -
	Issuing Agency	National Water Resources Board
	Date of Issuance	---
	Valid Until	- no expiration -
	Conditions	(P.D. 1067 Water Code)
Hazardous Waste Generator ID	Registration No.	- For application -
	Approving Agency	EMB Region 10
	Date of Approval	---
	Valid Until	- no expiration -
	Conditions	---
PCO (Pollution Control Officer) Accreditation Certificate	Accreditation No.	- For training and application -
	Issuing Agency	---
	Date of Issuance	---
	Valid Until	---

CMR Compliance Monitoring Report
 EMB Environmental Management Bureau
 P.D. Presidential Decree

Table 2. Permits ensuring the safety of CPA 34’s facilities and operation

DOCUMENT	PARTICULARS	
Business Permit	Permit No.	BP-2019-00449-0
	Issuing Agency	Office of the Mayor - Oroquieta City
	Date of Issuance	January 11, 2019
	Valid Until	December 31, 2019
	Prerequisites	compliance with the requirements of the following: Building Permit Occupancy Permit Zoning Clearance Sanitary / Health Certificate Fire Safety Inspection Certificate
Zoning Clearance	Registration No.	- on going conversion -
	Approving Agency	City Planning and Development Office
	Date of Approval	-
Fire Clearance	Reference No.	AVAILABLE AND UP TO DATE
	Issuing Agency	Bureau of Fire Protection Regional Office 10
	Date of Issuance	January 2019
	Valid Until	December 31, 2019
	Prerequisites	compliance with R.A. 9514 (Revised Fire Code)
Sanitary Permit	Permit No.	AVAILABLE AND UP TO DATE
	Issuing Agency	City Health Office – Oroquieta City
	Date of Issuance	January 2019
	Valid Until	December 31, 2019
	Prerequisites	compliance with P.D. 522 (‘Sanitation Requirements’), P.D. 856 (Code on Sanitation), and pertinent local ordinances

2.2.2 Environmental Management and Monitoring Plan

Table 3 summarizes the measures CPA 34 is implementing and intends to implement 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 3. Environmental Management and Monitoring Plan of CPA 34

IMPACT	SOURCE / ACTIVITY	MEASURES	STATUS			MONITORING METHOD	FREQUENCY	PARAMETER / INDICATOR	RESPONSIBLE ENTITY	REPORTING TO	Cost ^a , Php
			Existing / Current Practice	To be Implemented / 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	Supervisor	Owner > reported in SMR	(Project cost)
		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	Supervisor	Owner > reported in SMR	-
		lined sewage septic tanks	✓								
		sewage disposal to treatment plant		✓							
B. Solid Waste											
b.1 generation of manure, sludge	pig raising, feed wastage, WTF	minimize feed wastage		✓		quantify (dried) sludge produced	annually	amount of sludge produced	Maintenance	Owner > reported in SMR	(Project cost)
		treatment of manure in WWTF	✓								
b.2 generation of (non-infectious) carcasses, blood, etc.	injuries, adverse environmental conditions, etc.	observe sound pig raising practices and biosecurity measures	✓			weigh disposed materials	daily	weight of materials disposed	Maintenance	Owner > reported in SMR	-
		regular inspection and preventive maintenance of equipment	✓								
		regulating pig environment									
		carcass disposal through burial	✓								
		composting of carcasses and pathological materials			✓						
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	Maintenance	Owner > reported in SMR	
		adequate collection bins, proper storage	✓								
		reuse, recycling / selling of recyclables		✓							
		residuals hauled to the sanitary landfill		✓							
		composting		✓							
C. Hazardous Materials											
c.1 generation of hazardous, toxic wastes	facilities' operation and maintenance	monitors resource usage to avoid expiration of chemicals		✓		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	Maintenance	Owner > reported in SMR	-
		disposal through accredited TSD		✓							
		reusing, recycling (for various construction and maintenance activities)	✓								
c.2 generation of infectious, pathological wastes, carcasses	veterinary activities, infections, outbreaks	disposal through burial	✓								
D. Air Pollution											
d.1 generation of air pollutants	vehicles, stand-by generator sets (fossil fuel combustion)	operates equipment according to manufacturer's instruction	✓			review inspection and maintenance record	quarterly	number and details of machinery issues noted	Supervisor	Owner	(cost of maintenance, including salaries)
		regular inspection and preventive maintenance of equipment	✓								
E. Risk of Environmental Degradation											
e.1 surface water and groundwater quality degradation, disruption of soil properties, contamination	e.1.1 wastewater collection, transport, treatment, disposal	WWTF constructed with durable materials	✓			effluent sampling and testing by an EMB-accredited laboratory	quarterly - more frequently during rainy seasons	effluent quality indicators: BOD, TSS, ammonia, phosphate (must meet standards for Class C effluent)	Supervisor	Owner > reported in SMR	(cost of maintenance, including salaries) 60,000 / yr for effluent testing
		operates WWTF as prescribed	✓								
		regular inspection and preventive maintenance of WWTF	✓								
		concrete underground biodigester	✓								
		adequate rainwater and wastewater separation	✓								
		adequate groundwater and wastewater separation	✓								
		establish vegetation (filter strips) around lagoons		✓							
		has and implements contingency response plan		✓							
	e.1.2 pathological wastes, carcass disposal, leachate	disposal through burial	✓			review inspection and maintenance record	monthly - more frequent during rainy season	number and details of leak / breach incidents	Maintenance	Owner	-
		create diversion banks, drains around disposal site		✓							
		establish vegetation (filter strips) around disposal site		✓							
		has and implements contingency response plan		✓							
	e.1.3 handling, transport, storage, disposal of hazardous and infectious materials	use materials according to registered use / manufacturer's instruction	✓			review inspection and maintenance record	weekly	number and details of leak / breach incidents	Supervisor	Owner	(cost of signage cost) 50,000 (cost for TSD disposal)
		MSDS available and consulted		✓							
		proper and secured storage		✓							
		spill kits available		✓							
		appropriate signage, warnings in place		✓							
		regular inspection of storage, disposal facilities	✓								
		has and implements contingency response plan		✓							
		adequate training on handling hazardous materials		✓							
	e.1.4 natural hazards	steel reinforced concrete wastewater reservoirs	✓			review inspection and maintenance record	monthly - more frequently during rainy seasons	details of inspection report	Maintenance	Owner	(cost of slope protection)
		adequate runoff channels	✓								
		slope protection measures		✓							
		plant / maintain vegetation along / on sloping areas		✓							
e.2 (release of GHGs)	e.2.1 anaerobic digestion, biogas collection and utilization, fugitive biogas	biogas sequestered using biodigester	✓			review inspection and maintenance record	monthly	number and details of leak / breach incidents (odor detection)	Maintenance	Owner	(cost of maintenance, including salaries)
		MRF constructed with durable materials	✓								
		operate MRF as prescribed	✓								
		regular inspection and preventive maintenance of MRF	✓								
		has and implements contingency response plan		✓							
		has flare	✓								
	e.2.2 use of electricity from grid	energy conservation strategies	✓			review billing statement	monthly	kWh consumption	Maintenance	Owner > reported in SMR	-
		uses renewable fuel (biogas from MRF)	✓								
		uses energy-efficient equipment	✓								
e.3 groundwater depletion	pig raising, general farm activities	water conservation strategies	✓			quantify volume of freshwater consumption	monthly	volume of freshwater consumed	Supervisor	Owner > reported in SMR	(flow meter cost)
		effluent recycling		✓							
		rainwater harvesting			✓						
F. Health and Safety – Anaerobic Digester System											
f.1 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	Maintenance	Owner	(signage cost) (cost of fire protection)
		operates WWTF-MRF according to design	✓								
		regular monitoring of pressure within the MRF system	✓								

		regular inspection and preventive maintenance of MRF	✓							equipment)
		restricts access to MRF		✓						(cost of maintenance, including salaries)
		prohibits ignition sources near MRF		✓						
		'no smoking' policy / designated smoking area		✓						
		appropriate signage, warnings in place	✓							
		fire protection equipment on site	✓							
		adequate training on biogas safety		✓						
f.2 asphyxiation, poisoning	biogas	appropriate signage, warnings in place		✓						(cost of PPE)
		adequate training on biogas safety		✓						(signage cost)
		use of appropriate PPE		✓						
f.3 infection, infestation	wastewater, sludge	appropriate signage, warnings in place	✓							(cost of PPE)
		adequate training on handling infectious materials		✓						
		uses appropriate PPE		✓						(cost of employees' health checks)
G. Health and Safety – General Farm Operations										
g.1 odor - nuisance, discomfort, health issues	g.1.1 pig houses, manure	regular cleaning, disinfection	✓							(cost of cleaning materials)
		tunnel ventilated buildings	✓							
		plant / maintain buffer trees / vegetation		✓						(cost of PPE)
		uses appropriate PPE		✓						(cost of maintenance)
	g.1.2 WTF, effluent, MRF	employs biodigester (traps odor and biogas)	✓							
		adequate retention time of wastewaters in the biodigester		✓						
		regular inspection and preventive maintenance of WWTF-MRF	✓							
		plant / maintain buffer trees / vegetation		✓						
		uses appropriate PPE		✓						
	g.1.3 decomposing materials (sludge and organic solids)	uses appropriate PPE		✓						
	g.1.4 decomposing materials (placental materials and carcasses)	disposal through burial	✓							
		prevent leachate leakage		✓						
		uses of appropriate PPE		✓						
g.2 noise - nuisance, discomfort	g.2.1 pigs	uses appropriate PPE		✓						(cost of PPE)
		adequate spatial buffer from surrounding communities	✓							(cost of seedlings)
		plant / maintain buffer trees / vegetation		✓						(cost of maintenance)
	g.2.2 vehicles, machineries	operates equipment according to manufacturer's instruction	✓							
		limits operation during day time	✓							
		regular inspection and preventive maintenance of machineries	✓							
		noise reduction equipment		✓						
		uses appropriate PPE		✓						
g.3 dust - nuisance, discomfort, health issues	g.2.1 pig houses, feed handling	tunnel ventilated buildings	✓							-
		uses appropriate PPE		✓						
	g.2.2 composting areas, dried compost handling	limit dust-generating activities during day time, low wind movement	✓							
		uses of appropriate PPE		✓						
		limits vehicular speed on unsealed roads	✓							
		limit dust-generating activities during day time	✓							
		uses of appropriate PPE		✓						
g.4 pest and vermin proliferation / infestation - nuisance, health issues	decomposing materials, sources of odors	observes good housekeeping practices	✓							(cost of pest control)
		odor control measures	✓							
		pest, vermin control measures	✓							
g.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		✓						(cost of PPE)
		uses appropriate equipment (including PPE) for handling, storage of hazardous and infectious materials		✓						(cost of supplies for biosecurity)
		enforce, observe biosecurity, health and safety protocols	✓							
		pest and vermin control measures	✓							
g.6 drowning hazard	open ponds, lagoons, tanks	restricted access to WWTF		✓						(cost of signage)
		appropriate signage and warnings		✓						

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

^ Indicative cost

2.2.3 Contingency Response

The following is an overview of the Farm's current preparation and plan of action in response to certain emergency incidents (see also Appendix B):

- a. Fire
 - Administration building and employees' dwellings are equipped with fire extinguishers whereas pig sheds have sprinklers and taps from which water for putting out fires can be sourced.
- b. Earthquake
 - The open grounds in front of the Farm are designated as evacuation area for when an earthquake occurs.
- c. Outbreak
 - The Farm's animal specialist (provided by the integrator) is immediately notified to assess the situation and give instructions for the workers to carry out.
- d. Power outage
 - A standby diesel-fueled generator is able to supply the Farm's electricity needs, in addition to the biogas genset.
- e. Health emergencies
 - A first aid kit is available at the site for minor health issues. Farm personnel have access to vehicles which can be used for transporting cases that may be needing more advanced medical care.

Most emergency services can be accessed in Oroquieta City proper after about a 15 to 20-min drive from the Farm.

In the event that any of the listed emergencies occur, farm personnel are to report to the Farm Supervisor who is in charge of alerting the owner and emergency services near the property.

2.2.4 Occupational Health and Safety

CPA 34's risk management plan for general occupational health and safety issues associated with work in the Farm is presented in Appendix C. 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.

2.4 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) and compliance monitoring reports (CMR). Furthermore, assessments will also be initiated during or immediately after incidents that may have compromised the integrity of the Farm's facilities, especially of the MRF and WTF, and caused 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.

SMRs and CMRs 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. Copies of these documents will be tendered to EMB quarterly and semi-annually, respectively, as well as to LBP-EPMD (Environmental Program and Management Department) for its reference and review.

The Farm Supervisor 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

3.1 Consultation and Participation

Stakeholders of the Project were identified and invited by the Proponent, together with LBP-EPMD, through letters and notices to the consultative meeting held on April 5, 2016 (2 PM) I Oroquieta City. The meeting was attended by at least 67 individuals from various institutions, including local officials and residents of communities near the project site.

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

3.2 Grievance Redress Mechanism

The Farm supervisor is hereby designated as the main contact person for grievances, feedbacks, and queries related to the Project. She is to ensure that the details of complaints and the actions made to address the same will be recorded completely and truthfully in a register. Such information shall be part of the regular monitoring report for the Project and will be made available to relevant stakeholders.

The Proponent will make reasonable effort to settle any concern at the Project level. Should its attempts be unsuccessful, issues will be raised to the following third party institutions for arbitration and possible resolution:

- Office of the Barangay Chairman
Complaints shall be entertained in the *barangay* where the farms are situated. The *barangay* office 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 other relevant municipal agencies.
- 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 LBP-EPMD shall be provided to stakeholders during consultations and through postings at public notice boards. For the Project of CPA 34 Farm, 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

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 EMB Region 10, in LANDBANK's library (1598 M.H. Del Pilar cor Dr. J. Quintos St., Malate, Manila, Philippines), and in World Bank's Info Shop.

3.4 **Equal Opportunity**

CPA 34 is an equal opportunity employer, not regarding gender, age, disability, and ethnicity in evaluating and hiring potential employees. Presently, the Farm's workforce is consisted of 10 males and 5 females. Most of the male workers perform manual, physically demanding work such as animal handling and facility maintenance. The females take on administrative and supervisory roles.

3.5 **Resettlement**

The Project is located inside the premises of CPA 34 Farm, 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 34 Farm receive standard basic salary at the minimum, 13th month pay, and other regular statutory benefits, in addition to free food and lodging at the Farm.

4 ESMP REVIEW AND UPDATING

This ESMP shall be reviewed annually and will be updated subject to the results of the semiannual monitoring activities conducted by the Proponent and LBP-EPMD. Reviews may be done more frequently or earlier than schedule, especially after events resulting in significant adverse effect to the environment.

5 INSTITUTIONAL ARRANGEMENTS

5.1 The Proponent

CPA 34 will be responsible in all the aspects of the Project, including the implementation of this ESMP. It will shoulder all costs associated with the construction and operation of the Project, internal monitoring activities, and meeting various statutory requirements. Specifically, it shall / it 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

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 memorandum of agreement (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 34 Farm 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, 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 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 onsite 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 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.

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 a Multi-partite Monitoring Team) the periodic monitoring of the Project's compliance and impacts, including the fulfillment of the 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.

5.4 **Municipal Government**

The city government of Oroquieta licenses the operation of CPA 34 through the issuance of a business permit. This permit is only given to businesses after satisfying its prerequisites – building and occupancy permits, zoning clearance, sanitary permit, and fire clearance, among others.

Agencies and offices of Oroquieta City government will also, if necessary, lead / facilitate the resolution of complaints arising from the farm and the Project's operations.

5.5 **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 appraisals on the Project's safeguards 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, 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.

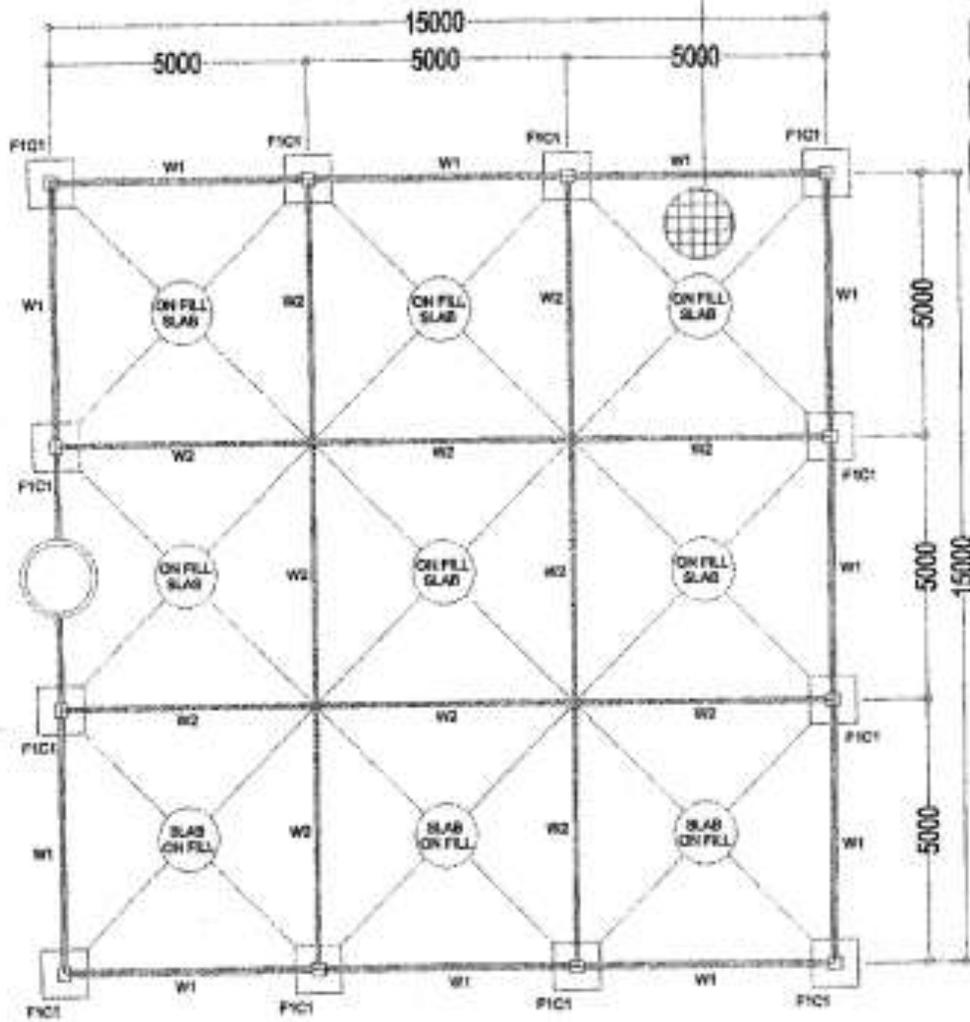
REFERENCES

- 1 en.climate-data.org
- 2 vm.observatory.ph
- 3 dbmp.philrice.gov.ph/soils
- 4 noah.up.edu.ph (ESRI Base Map)

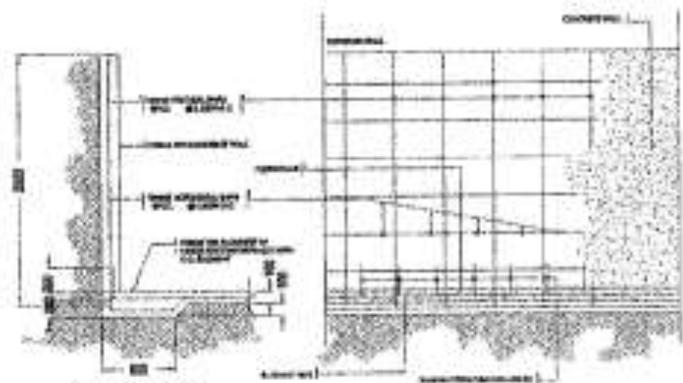
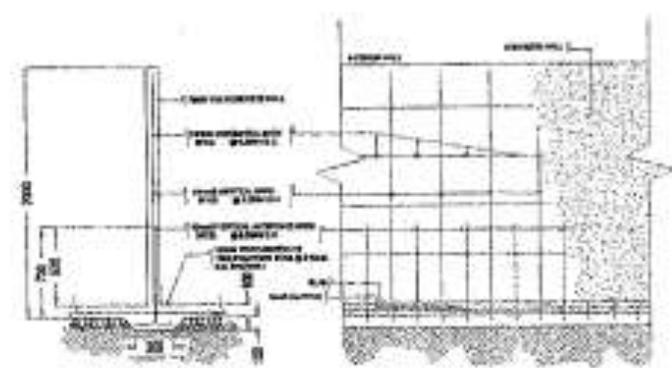
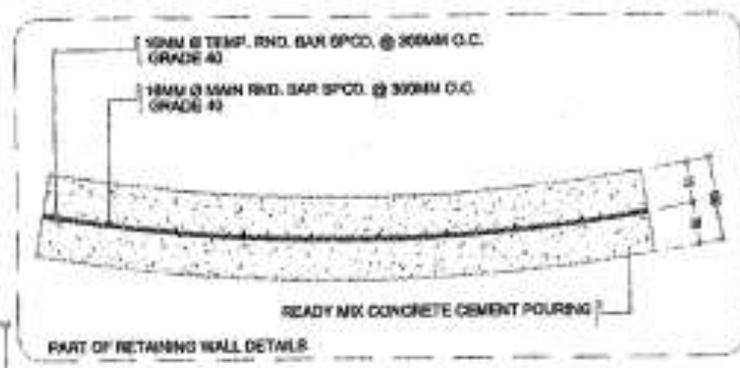
APPENDICES

- A Project Design, Plan and Specifications
- B Contingency Plan
- C Health and Safety Risk Management Plan

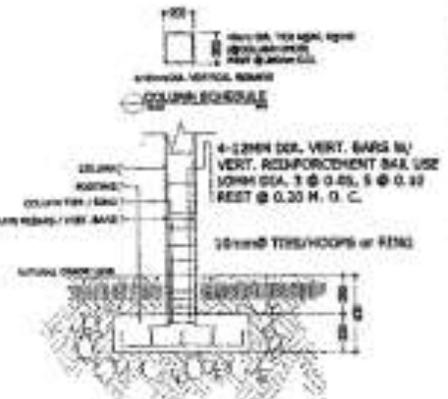
10MMØ SLAB MATTING
DEF. ROUND BAR
SPACED @ 300MM O.C



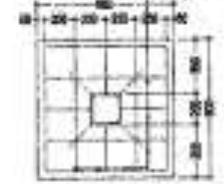
A WATER RECOVERY
S-3-3 SCALE: 1/8"=1'-0"



B WALL AND WALL FOOTING DETAILS
S-3-3 SCALE: 1/8"=1'-0"



SECTION



PLAN

C FOOTING AND COLUMN DETAILS
S-3-3 SCALE: 1/8"=1'-0"



DESIGNED BY
ENGR. JUSTIN D. SIGMAR
CHECKED BY
DATE: 08/28/23
TITLE:

REVISION: 1 (08/28/23)
ENR: 482875
PREP: 48062
DATE: 08/28/23
TITLE:

PROJECT: 232
PROJECT NO:
PROJECT OR CLIENT NAME: 1400 W. 14TH AVE. FREDERICK, MD 21704-0001

ARCHITECT: 1400 W. 14TH AVE. FREDERICK, MD 21704-0001
CLIENT: 1400 W. 14TH AVE. FREDERICK, MD 21704-0001

SHEET CONTENTS: AS SHOWN.
SHEET NO: 3
SCALE: 1/8"=1'-0"

APPENDIX B. Site Evacuation Plan



CPA 34 Point Persons:

Owner: <name> <contact details>
Farm Supervisor: <name> <contact details>
Biodigester / Genset Maintenance: <name><contact details>

Local Emergency Contact Details:

CDRRMO - AMBULANCE & FIRE – 0930 0105830 / (088) 586-0246

Oroquieta City Fire Department – **106** (hotline) / (088) 531-2066
Misamis Occidental Provincial Fire Marshall -- (088) 531-1928

Police Department – **166**
Oroquieta City Police Station - (088) 531-2077 / 0907 3021414

Misamis Occidental Provincial Hospital - (088) 531-2244
Misamis Occidental Provincial Health Office - (088) 531-1529

MOELCI Oroquieta City - (032) 531-1207, 531-1211

APPENDIX C.

Health and Safety Risks Management Plan of CPA 34 Farm

Hazard	Possible Harm	Source / Cause	Prevention / Minimization*	Person/s Responsible
physical				
noise	discomfort, hearing damage	pig squeals	- wear appropriate PPE (ear protection)	Farm Personnel
		running machineries and vehicles	- install noise-control devices when applicable - regular equipment inspection and maintenance - equipment housed in enclosed structure, if applicable - schedule shifting duties - install signage and warnings - wear appropriate PPE (ear protection)	Supervisor Farm Personnel
vibration	discomfort, ergonomic and nerve injuries, fatigue	running machineries	- ensure all loose equipment are securely placed - perform regular equipment inspection and maintenance - install signage and warnings	Supervisor Farm Personnel
electricity	shock, electrocution, burns	faulty machineries and power lines	- get services of a licensed electrician - consult equipment manual - perform regular equipment inspection and maintenance	Maintenance Farm Personnel
		improper use (or servicing) of electrical equipment	- restrict access to equipment - install signage and warnings - train staff (consult equipment manual) - wear appropriate PPE	
heat	burns	running machineries (hot surfaces, vapors, liquids)	- use insulation where possible - install machine guards - install signage and warnings - wear appropriate PPE (such as long sleeved shirts)	Maintenance Farm Personnel
	discomfort, heat exhaustion, heat stroke	working in enclosed spaces with limited ventilation	- adequate hydration and rest breaks	Supervisor
dust	irritation, respiratory distress / diseases	feeds, ambient dust	- calm work pacing to avoid exciting the pigs - thorough cleaning of indoor spaces - PPEs (mask)	Farm Personnel
poor lighting	eye strain, can't see hazards	unlit / inadequately lit areas	- install light sources - carry portable light sources - work during daytime whenever possible	Supervisor Farm Personnel
chemical				
harmful gases, dust, vapors (inhalation)	discomfort (odor), asphyxiation, poisoning, respiratory distress / diseases	degrading organic wastes	- observe measures for odor control - install signage and warning labels - train staff (on handling hazardous substances and wastes and working in confined spaces; review MSDS / product information sheets) - wear appropriate PPE (mask) - ensure first aid kits are readily available	Owner Supervisor Farm Personnel
		hazardous substances (cleaning and pest control chemicals, veterinary medicines, fuels, hazardous wastes, etc.)		
		fuel burning (machineries, vehicles)	- perform regular equipment inspection and maintenance	Maintenance
		fugitive gases	- perform regular inspection and maintenance of biogas system	Maintenance
hazardous substances (contact, ingestion)	irritation, burns, poisoning, skin problems	hazardous substances (cleaning and pest control chemicals, veterinary medicines, fuels, hazardous wastes, etc.)	- use proper labeling, 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 - ensure first aid kits are readily available - PPEs (gloves, eye glasses)	Owner Supervisor
biological				
pathogens / infectious agents, toxins and other products	various infectious diseases, parasites, irritation	pathological materials / tissues	- observe proper disposal of animal and veterinary wastes - implement quarantine measures - good housekeeping practices (disinfection) - practice hygienic practices (especially hand hygiene) - perform workers' regular health examination - train staff (on animal handling, proper waste handling and disposal) - wear appropriate PPE (gloves, mask, goggles)	Owner Veterinarians Supervisor
		sick animals		
		animal excretions and fluids		
		manure (wastewaters)		
		sludge		
		veterinary wastes (especially sharps)		
		potential disease carriers (objects, people, dust)		
insects, pests, vermin	- proper disposal of odorous wastes - good housekeeping practices - implement pest control measures	Farm Personnel		
ergonomic				
ergonomic stress	ergonomic injuries	repetitive actions, forceful exertions, sustained awkward posture	- use aid of appropriate equipment for lifting/moving heavy objects - use of proper lifting techniques - implement buddy system at work - ensure job rotation / adequate rest (in between tasks)	Supervisor Farm Personnel
		improper use of equipment	- train staff (consult manuals)	Supervisor Farm Personnel
		use of faulty equipment	- repair or replace equipment	Supervisor
other accidents and contingencies				
slips, trips, falls	injuries, wounds, contusions	spills (slips)	- maintenance of walkways - daily safety briefings and regular trainings - barricading of work areas - wearing of appropriate PPE	Supervisor Farm Personnel
		various objects, debris (trips)		
		heights, slips (falls)		
entanglement	injuries, wounds, strangulation	machineries	- install machine guards - tie back long hair - wear long sleeve shirts - avoid wearing loose-fitting clothes and personal accessories - regular equipment inspection and maintenance	Farm Personnel
blows, punctures	injuries, wounds, contusions	pig handling	- use animal restraints - ensure enough space to maneuver - train staff (animal handling techniques) - wear appropriate PPE (boots, gloves, etc.)	Supervisor Farm Personnel
sharps	sharps injuries, wounds	veterinary activities, waste handling	- ensure only trained personnel conduct veterinary activities - wear appropriate PPE (gloves, goggles)	Supervisor Farm Personnel

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 - install signage and warnings - train staff (on contingency plan and proper equipment use) - perform regular inspection and maintenance of electrical systems and equipment 	Owner Maintenance
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 - perform regular inspection and maintenance of MRF - install signage and warnings 	Lead Man Maintenance

* Shaded rows / items applicable for Anaerobic Digestion System