

**COMMERCIAL BIOGAS PLANT
DETAILED FEASIBILITY STUDY**

AT

Amrit Cow Farm

Aabukhaireni-6, Tanahu

Submitted To:

Biogas Sub Component (NRREP)
Alternative Energy Promotion Centre (AEPIC), Khumaltar,
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Appendix III : Environmental and Social Management Plan

Environmental and Social Management Plan (ESMP)

Amrit Cow Farm, Aabu Khaireni-6, Tanahun

Executive Summary: This Environmental and Social Management Plan (ESMP) has been developed for proposed 20 m³ biogas project within Amrit Cow Farm in order to mitigate the likely environmental impacts predicted during environmental and social Screening. The overall impact caused by the sub project intervention was classified as “Category C” with minimal environmental impact and hence there is no need of conduction of further environmental or social assessment. The environmental and social impacts caused by the project are: health and safety issues of construction workers, increased dust level during construction phase, pit waste (muck) disposal, possible water sources contamination due to leakage of slurry liquid, workers health during slurry handling and foul smell. The possible mitigation measures have been proposed in this ESMP and shall be implemented by the Construction Company and developer. In addition, the monitoring as mentioned in this ESMP shall also be performed accordingly. The likely impacts not identified during screening as well as in this ESMP, if perceived during construction and/or operation phase shall also be avoided or mitigated by the Construction Company and/or developer.

कार्यकारी सारांश : अमृत गाई पालनमा प्रस्तावित २० घन मिटरको बायोग्यास प्लाण्ट निर्माण तथा सञ्चालनबाट हुनसक्ने सम्भावित प्रतिकूल वातावरणीय तथा सामाजिक प्रभावहरूको न्यूनिकरण गर्न यस वातावरणीय तथा सामाजिक व्यवस्थापन योजना तयार गरिएको छ । सम्भाव्यता अध्ययनको सिलसिलामा सम्पन्न वातावरणीय तथा सामाजिक छनौटले पहिचान गरिएका प्रतिकूल प्रभावहरूलाई मध्यनजर गरि यस परियोजनालाई “ग बर्ग” मा बर्गीकरण गरिएको छ । यस परियोजनाबाट उल्लेख्य वातावरणीय तथा सामाजिक प्रभावहरू पार्ने नदेखिएतापनि सामान्य प्रभावहरू जस्तै निर्माण चरणमा कामदारहरूको स्वास्थ्यमा हुनसक्ने प्रभाव, निर्माण क्षेत्रमा धुलोको सामान्य वृद्धि, डोम उत्खननबाट निस्कने माटोको व्यवस्थापन, स्लरीको चुहावटबाट पानीको श्रोतमा हुनसक्ने प्रदुषण, स्लरी तथा कम्पोष्टमल सम्बन्धीका कार्यगर्दा हुनसक्ने स्वास्थ्य सम्बन्धी समस्या तथा परियोजना क्षेत्रमा हुनसक्ने दुर्गन्ध जस्ता प्रभावहरू पर्न सक्ने देखिन्छ । यस वातावरणीय तथा सामाजिक व्यवस्थापन योजनाले माथि उल्लेखित सामान्य प्रभावहरूको न्यूनिकरणका उपायहरू निर्दिष्ट गरेको छ, र यी प्रभाव न्यूनिकरणका उपायहरू अनिवार्य रूपमा लागु गर्नका साथै सो को अनुगमन समेत गर्नुपर्ने छ । यदि यस योजनामा उल्लेख नभएका कुनै प्रभावहरू परियोजना निर्माण तथा सञ्चालनका समयमा उत्पन्न भएमा त्यस्ता प्रभावहरूलाई समेत न्यूनिकरण गर्ने दायित्व निर्माण कम्पनी वा सञ्चालकको हुने छ ।

1. Introduction

This environmental and social management plan is prepared for Amrit Cow Farm, Aabu Khaireni-6, Tanahun, Nepal in order to implement the biogas project. The institution is going to establish 20m³ large biogas plant in its own compound. The project is supported by AEPC/NRREP/SREP .

2. Description of Subproject and Location

The project lies in Aabu Khaireni-6, Tanahun district. Locally, the subproject is proposed to be constructed within the cow farm. The Google map of the proposed location is provided below:



Figure: Location Map of proposed project

The proposed capacity of biogas plant to be installed in Amrit Cow Farm is 20m³. It will produce 4.4m³ of biogas per day. The project will produce 244 kg of slurry in each day which will be stored in compost pit to make it dry and convert it into compost manure. The major works that will be carried out during establishment are excavation of earthwork, stone lining, and reinforcement and cement aggregate works. Once after the construction completion, the cow waste as mentioned in detailed feasibility study will be fed into the digester. Once after gas production starts, AEPC will perform testing and commissioning and verify the amount of gas production as

specified in DFS. The gas produced from the subproject intervention shall be used for thermal process only.

3. Relevancy of preparing ESMP

This Environmental and Social Management Plan (ESMP) has been developed for proposed project in order to mitigate the likely environmental impacts predicted during environmental and social Screening. The screening process indicated that the sub project intervention will not require any land acquisition as well as displacement of inhabitants. Similarly, as the project itself reduces wastes and use of waste in order to produce energy, the negative impacts are not envisaged. However, negligible impacts identified during screening process might prevail during construction and operation phase. The overall impact caused by the sub project intervention was classified as “Category C” with minimal environmental impact and hence there is no need of conduction of further environmental or social assessment. The Environmental and Social Management Plan has been prepared in order to reduce thus identified adverse impacts prior to sub project implementation.

4. Environmental and Social Baseline

Topographically, the project site lies in the Hills region of Nepal. From environmental aspect there is Marsyangdi river at a distance of about 150 meters only. The meteorological data from 2008 to 2010 indicated that the region (Abu Khaireni) has mean annual maximum temperature is about 39°C and minimum temperature is about 2 °C. The total annual rainfall received by the station in 2010 was 1880 mm with maximum 24hr rainfall as 135 mm. The land-use pattern of the project area indicates a mix of agricultural land and settlement.

5. Environmental and Social Impacts

During feasibility study of Amrit Cow Farm, considering environmental and social screening performed, it is not predicted to have significant negative environmental and social impacts. The beneficial impact in environment is conversion of waste into compost and gas. Socially the project will demonstrate the renewable energy project in the locality.

5.1 Beneficial impact

From beneficiaries point of view there seems no direct benefit to the local people, during the construction phase there can be a job opportunities.

5.2 Adverse impact

The project will not pose any major adverse impact to the surrounding community and environment, the minor impacts seems to be created during construction phase like increased noise level, dust pollution and occupational health and safety of construction workers.

5.2.1 Adverse impact (Construction phase)

During the construction phase the adverse impact that are expected to happen can be listed as below:-

- a. Worker health from dust inhalation during excavation and construction work.
- b. Increased noise level due to use of machineries
- c. Pit waste material transport and disposal
- d. Construction related accidents (health and safety issue)

5.2.2 Adverse Impact (Operation Phase)

During the operation phase the adverse impact that are expected to happen can be listed as below:-

- a. Ground water pollution or contamination of water source due to leakage of slurry liquid.
- b. Chance of polluting road and foul smell from cow dung during carriage for feeding.
- c. Infection of pathogens during collecting cow dung to plant and slurry handling.
- d. Foul smell due to slurry around surrounding community, during extreme temperature and windy day.
- e. Polluting the road and foul smell from compost while transporting to market.
- f. Spreading of disease due to increased disease vectors, flies, mosquitoes etc.

ENVIRONMENTAL & SOCIAL MITIGATION MEASURES

The environmental mitigation with their time of action, mitigation cost and responsibility are illustrated in the following table:

Phase	Issue	Mitigating Measure	Cost of Mitigation (If Substantial)	Responsibility	Start Date	End Date
Construction	Worker health from dust inhalation	<ul style="list-style-type: none"> Workers will be required to wear filter masks and eye protection Dusty areas (construction site) will be sprayed with water, particularly during hot, windy weather 	<ul style="list-style-type: none"> Minor Minor 	Construction contractor	Digester pit, outlet pit and, manhole construction activities begin	Digester, outlet and compost pit construction is complete
Construction	Pit waste material transport and disposal	The waste material will be used for filling up a nearby pit or low land, the useful stone will be used in construction purpose the waste will be disposed safely.	<ul style="list-style-type: none"> Minor 	Construction contractor	Construction of pit begins	Construction of pit begins
Construction	Increased Noise	Work will be conducted weekdays from 8:00 AM-6:00 PM If additional times are needed, local residents will be informed at least	Minor	Construction contractor	Construction activities at site and connection line begin	Construction activities at site and connection line end

		one week in advance and will be done in consultation with locals				
Construction	Construction related accidents (Health and safety issue)	<ul style="list-style-type: none"> • Precautions need to be followed in every steps. • Presence of First Aid kit in the work site. 	<ul style="list-style-type: none"> • Minor 	Construction Contractor	Construction of pit begins	Construction of pit begins
Operation	Possible Intrusion of Slurry and Waste Water into the Marsyangdi River	<ul style="list-style-type: none"> • Compost pit will be constructed as per the design and the cost given in BOQ. • Periodic monitoring of the plant and checking for leakages and rectification. • Post treatment of the waste water such that the excess water is recirculated into the biogas digester. 	<ul style="list-style-type: none"> • Cost of compost pit already included in BoQ and construction cost. 	Contractor Client	Construction of pit begins	Till the project runs.
Operation	Ground water pollution due to leakage of slurry liquid possibility of contamination of drinking water pipes	Compost pit will be water tight, rain water will be drained avoiding entering into the pit/ proper drainage channel will be constructed to guide the overflowing slurry. Water proofing and sealing while constructing dome, outlet and compost pit during construction	Minor	Contractor Contractor	Compost pit construction/ project operation phase	End of compost pit construction/end of project operational phase

	due to the surface and subsurface flow of slurry liquid					
operation	Pathogens harm during Slurry handling to clear compost pit and making dry compost	Workers will be required to provide with appropriate clothes, gloves and masks. The equipment's should be rinse with clean water after use and kept in safe place. soap for cleaning themselves	Minor	Client	Periodic, during clearing up slurry and making dry compost	Till the compost is transported to the market.
Operation	Foul smell due to slurry around surrounding community, during extreme temperature and windy day.	Cultivation flower trees as windbreak.	Minor	client	Till the project runs	Till the project runs

ENVIROMENTAL & SOCIAL MONITORING PLAN

Phase	What parameter is to be monitored?	Where is the parameter to be monitored ?	How is the parameter to be monitored/ type of monitoring equipment?	When is the parameter to be monitored -frequency of measurement or continuous?	Monitoring Cost What is the cost of equipment or contractor charges to perform monitoring	Responsibility	Start Date	End Date
Construction	Worker health Dust levels	At construction site	Visual: Worker wearing equipment Dust visible	Weekly: random times Weekly, more frequently during dry, windy either	Minor Minor	Construction Contractor Construction Contractor	Construction activities begin	Till construction work ends.
Construction	Pit waste material transport and disposal	At construction site At disposal site	properly Visual: Trucks covered or watered Material deposited	Daily Weekly	Minor Minor	Construction Contractor Construction Contractor	Start of construction of pit	Till pit construction ends

Construction	Noise	At construction site	Direct Observation; dB meter	Weekly or if there are local complaints	Minor	Construction Contractor	Construction activities at site and when vehicles run frequently	Construction works end
Construction	Machinery engine emissions	At construction site	Visual: Examine engine exhaust certification	Equipment first comes to project site	Minor	Construction Contractor	Construction activities at site connection line begin	Construction activities at substation and connection line end
Operation	Proper management of slurry waste and waste water via composting.	At Construction site.	Visual: Periodic monitoring and testing	Monthly	Minor	Contractor Clients	Construction begins.	Till the project runs.
Operation	Ground water pollution due to leakage of slurry liquid; possibility of contamination of drinking water pipes due to the surface and subsurface	In the periphery of 100m of project site	Slurry properly managed. No leakage and overflow in outlet and compost pit.	Monthly	Minor	Client	Entire operation phase	Entire operational phase

	flow of slurry liquid							
Operation	Pathogens harm during Slurry handling to clear compost pit and making dry compost	For workers	Monitoring of use of personal protective measures during slurry handling.	Once in two month	Minor	Client	Start of Compost pit clearing	End of compost pit clearing
Operation	Foul smell due to slurry around surrounding community, during extreme temperature and windy day	Farm area and surrounding community	Comment from community, and workers in farm	Monthly	Minor	Client	Project operation phase	End of project operation phase.
Operation	Flies and mosquito breeding, due to slurry	Nearby farm area	Physically seen	Weekly	Minor	Client	Project operation phase	End of project operation phase

8. Conclusion

The above mentioned mitigation measures shall strictly be implemented by the responsible individuals as mentioned in this ESMP. In addition, the monitoring as mentioned in this ESMP shall also be performed accordingly. The likely impacts not identified during screening as well as in this ESMP, if perceived during construction and/or operation phase shall also be avoided or mitigated by the Construction Company and/or developer.