

Ministry of Science, Technology and Environment, Government of Nepal  
Alternative Energy Promotion Centre, Nepal

National Rural Renewable Energy Programme/Biogas Sub-Component  
Commercial Biogas Plant Detail Feasibility Study Report  
Of

**TinKanya Sana Kisan Organic Krishi Tatha Pasupalan Sahakari Sanstha (Ltd.)**  
**Benighat-1, Dhading District, Nepal**

*Submitted to:*



**Alternative Energy Promotion Centre (AEPC)**

*Submitted by:*



**Clean and Green Nepal**

*Supported by:*

<b>Bank of Kathmandu (BOK)</b>	<b>SNV Netherlands Development Organisation</b>	<b>Alternative Energy Promotion Centre (AEPC)</b>	<b>TinKanya Sana Kisan Organic Krishi Tatha Pasupalan Sahakari Sanstha (Ltd.), Benighat-1, Dhading District, Nepal</b>

**Date: 23<sup>rd</sup> June 2016**

## Appendix IV: Environmental and Social Management Plan (ESMP)

### *TINKANYA SANA KISAN ORGANIC KRISHI TATHA PASUPALAN SAHAKARI SANSTHA Benighat-1, Dhading*

**1. Executive Summary:** This Environmental and Social Management Plan (ESMP) has been developed for proposed 35 m<sup>3</sup> biogas project within Tinkanya Sanakishan Organic Krishi Tatha Pashupalan Sahakari Sanstha 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 noise 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 :** तिनकन्या साना किसान फार्ममा प्रस्तावित ३५ 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 ध्वनिको 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 गर्नाका 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 ।

## **2. Introduction**

This environmental and social management plan is prepared for Tinkanya Sanakishan Organic Krishi Tatha Pashupalan Sahakari Sanstha, Benighat-1, Dhading, Nepal in order to implement the biogas project. The institution is going to establish 35m<sup>3</sup> large biogas plant in its own compound. The project is supported by AEPC/NRREP/SREP and SNV Netherland.

### **Description of Subproject and location**

The Tinkanya Sana Kisan Organic Krishi Tatha Pasupalan Sahakari Sanstha is located at Benighat-1 of Dhading district. The Feasibility study recommended that it is feasible to construct 35 m<sup>3</sup> of biogas plant of Modified GGC 2047 model from available pig manure and toilet waste. The coordinate of the project site is 27°48'48.60"N, 84°50'11.40"E with altitude of 362m. The project site lies near the confluence of Trishuli river and its small tributary.

The figure provided below illustrates the project location as well as environmental setting near the project site.



### **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**

Physiographically, the project site lies in Inner Hill and the topography of the site is hilly. Regarding environmental and social setting, there is no any forest area within 2km of proximity. There is a Trisuli river approximately 3 km from the project location. The

meteorological data from 2008 to 2010 indicated that the region (Dhunibesi, Dhading) has mean annual maximum temperature is about 27.5°C and minimum temperature is about 15.8°C. The total annual rainfall received by the station in 2010 was 1422 mm with maximum 24hr rainfall as 74mm on September of that year. The land-use pattern of the project vicinity is semi urban area and agricultural land. The area can be considered as moderately settled mixed community dominated by Brahmin and Chhetri.

## **5. Environmental and Social Impacts**

As per environmental and social screening performed during feasibility study of Tinkanya Sana Kisan Organic Krishi Tatha Pasupalan Sahakari Sanstha, it is not envisaged 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. The project will provide renewable energy to the farm.

### **5.2 Adverse impact**

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

The potential impacts caused by the project as indicated in screening are as below:

#### **Construction phase**

- Construction related accidents (health and safety issue)
- Respiratory problem due to dusty environment/vehicular emission
- Increased noise level due to use of machineries.

#### **Operation phase**

- handling of bio-slurry and its management
- Possible intrusion of slurry into water source (Trishuli River)
- Accidents associated with firing and explosion
- Spreading of diseases due to increased disease vectors, flies, mosquitoes etc.

## **6. Mitigation Measures**

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

## Annex 2a: Format of Environmental and Social Mitigation Matrix

S.N.	Environmental Impacts	Mitigation Measures	Time of Action	Mitigation (NRs.)	Cost	Responsibility
<b>1.</b>	<b>Construction Phase</b>					
1.1	Worker health from dust inhalation	<ul style="list-style-type: none"> <li>Workers will be required to wear filter masks and eye protection</li> <li>Dusty areas (construction site) will be sprayed with water, particularly during hot, windy weather</li> </ul>	<ul style="list-style-type: none"> <li>Digester pit, outlet pit and, manhole construction activities begin</li> <li>Digester, outlet and compost pit construction is complete</li> </ul>	<p>Minor</p> <p>Minor</p>		Construction contractor
1.2	Increased Noise	<p>Work will be conducted weekdays from 8:00 AM-6:00 PM</p> <p>If additional times are needed, local residents will be informed at least one week in advance and will be done in consultation with locals</p>	<ul style="list-style-type: none"> <li>Construction activities at site and connection line begin</li> <li>Construction activities at site and connection line end</li> </ul>	Minor		Construction contractor
1.3	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"> <li>Construction of pit begins</li> <li>Construction of pit ends.</li> </ul>	Minor		Construction contractor
<b>2.</b>	<b>Operation Phase</b>					
2.1	Ground water pollution due to leakage of slurry liquid  Possibility of	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Compost pit construction/project operation phase</li> <li>End of compost pit construction/end of project operational phase</li> </ul>	Minor		Contractor

	contamination of drinking water pipes due to the surface and subsurface flow of slurry liquid	<ul style="list-style-type: none"> <li>Water proofing and sealing while constructing dome, outlet and compost pit during construction</li> </ul>			
2.2	Pathogens harm during Slurry handling to clear compost pit and making dry compost	Workers will be required to provide with appropriate cloths, globe and masks. The equipments should be rinse with clean water after use and kept in safe place. soap for cleaning themselves	<ul style="list-style-type: none"> <li>Periodic, during clearing up slurry and making dry compost</li> <li>Till the compost is transported to the market.</li> </ul>	Minor	Client
2.3	Polluting the road and foul smell from compost while transporting to market	The transporting trolley will be fully covered	<ul style="list-style-type: none"> <li>After loading the compost in transporting vehicle</li> <li>Till it reaches to the market or farm field.</li> </ul>	Minor	Client
2.4	Foul smell due to slurry around surrounding community, during extreme temperature and windy day.	Covering compost pit with plastic, cultivation flower trees that spread good smell.	<ul style="list-style-type: none"> <li>Till the project runs</li> </ul>	Minor	Client
2.5	Flies and mosquito breeding, due to slurry	Avoiding waste water pits near project area	<ul style="list-style-type: none"> <li>After loading the compost in transporting vehicle</li> <li>Till it reaches to the market or farm field.</li> </ul>	Minor	Client

**ENVIROMENTAL MONITORING PLAN**

<b>Phase</b>	<b>What parameter is to be monitored?</b>	<b>Where is the parameter to be monitored?</b>	<b>How is the parameter to be monitored/ type of monitoring equipment?</b>	<b>When is the parameter to be monitored -frequency of measurement or continuous?</b>	<b>Monitoring Cost</b> <i>What is the cost of equipment or contractor charges to perform monitoring</i>	<b>Responsibility</b>	<b>Start Date</b>	<b>End Date</b>
Construction	Worker health	At construction site	Visual: Worker wearing equipment	Weekly: random times	Minor	Construction Contractor	Construction activities begin	Till construction work ends.
	Dust levels		Dust visible	Weekly, more frequently during dry, windy weather	Minor			
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
Construction	Pit waste material transport and disposal	At construction site	Visual: Trucks covered or watered	daily	Minor	Construction Contractor	Start of construction of pit	Till pit construction ends
		At disposal site	Material properly deposited	Weekly	Minor	Construction Contractor		
Construction	Pathogens harm while filling Digester with feeding material (Chicken waste)	For workers	Visual: Manual or medical check up, pathogens lab test	monthly	Minor	Construction Contractor	Digester filling begins	Till the digester is filled
				Weekly	Minor		ROW clearance begins	ROW clearance begins
Operation	Ground water pollution due to leakage of slurry liquid; possibility of contamination of drinking water pipes due to the surface and subsurface flow of slurry liquid	In the periphery of 100m of project site	Water testing, slurry properly managed	Yearly	5000	Client	Entire operation phase	Entire operational phase

Operation	Pathogens harm during Slurry handling to clear compost pit and making dry compost	For workers	Health check up, pathogens lab test	Once in two month	Minor	Client	Start of Compost pit clearing	End of compost pit clearing
Operation	Polluting the road and foul smell from compost while transporting to market	From project site to market	Visual: Proper procedures followed	During transportation	Minor	Client	Transportation begins	Transportation ends
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

## **7. 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.