

**Appendix IV: Environmental and Social Management Plan  
(ESMP)  
Dibya Integrated Agriculture  
Production Centre,  
Kathmandu**

**Executive Summary:** This Environmental and Social Management Plan (ESMP) has been developed for proposed 15m<sup>3</sup> biogas project within Dibya Integrated Agriculture Production Centre in order to mitigate the likely environmental impacts predicted during environmental and social screening. This project is classified as “Category C”, which means there is minimum environment impact and hence there is no need of conduction of further environmental or social assessment.

As the distance between the project site location and the nearby Bagmati river is few hundred metres only, there is possible intrusion of slurry into the river. Therefore, care should be taken while managing the slurry output. The slurry should be managed so that it doesn't reach to the Bagmati river and doesn't affect its quality and aquatic life.

Some of the 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 साराश : दिव्य इन्टिग्रेटेड एग्निकल्चर प्रोडक्सन सेन्टर प्रस्तावित १५ घन मिटरको बायोग्यास प्लाण्ट निर्माण तथा सञ्चालनबाट हुन सक्ने सम्भावित प्रतिकूल वातावरणीय तथा सामाजिक प्रभावहरूको न्यूनिकरण गर्न यस वातावरणीय तथा सामाजिक व्यवस्थापन योजना तयार गरिएको छ । सम्भाव्यता अध्ययनका सिलसिलामा सम्पन्न वातावरणीय तथा सामाजिक छनौटले पहिचान गरिएका प्रतिकूल प्रभावहरूलाई मध्य नजर गरि यस परियोजनालाई “ग वर्ग” मा वर्गीकरण गरिएको छ ।

बायोग्यास प्लाण्ट निर्माण क्षेत्र र बाग्मती नदीको दुरी १०० मिटर मात्र रहेकोल स्लारी नदीको पानीमा मिसावट नहोस भनेर विशेष ध्यान पुऱ्याउन आवश्यक छ ।

यस परियाजनाबाट उल्लेखनिय वातावरणीय तथा सामाजिक प्रभावहरु पार्ने नदेखिए तापनि सामान्य प्रभावहरु जस्तै निर्माण चरणमा कामदारहरुका स्वास्थ्यमा हुनसक्ने प्रभाव, निर्माण क्षेत्रमा धुलाको सामान्य वृद्धि डोम उत्खननबाट निस्कने माटाको व्यवस्थापन, स्लरीको चुहावटबाट पानीका श्रोतमा हुनकन प्रदुषण स्लरी तथा कम्पोष्ट मल सम्बन्धीका कार्यगर्दा हुनसक्ने स्वास्थ्य सम्बन्धी समस्या तथा परियोजना क्षेत्रमा हुनसक्ने दुर्गन्ध जस्ता प्रभावहरु पर्न सक्ने देखिन्छ । यस वातावरणीय तथा सामाजिक व्यवस्थापन योजनाले माथि उल्लिखित सामान्य प्रभावहरुको न्युनिकरणका उपायहरु निर्दिष्ट गरेको छ र यी प्रभाव न्युनिकरणका उपायहरु अनिर्वाय रुपमा लागी गर्नाका साथै सो को अनुगमन समेत गर्नु पर्ने छ । यदि यस योजनामा उल्लेख नभएका कुनै प्रभावहरु परियोजना निर्माण तथा सञ्चालनका समयमा उत्पन्न भएमा त्यस्ता प्रभावहरुलाई समेत न्युनिकरण गर्ने दायित्व निर्माण कम्पनी वा सञ्चालकको हुने छ ।

## **1. Introduction**

For implementation of the biogas project, this environmental and social management plan is prepared for Dibya Integrated Agriculture Production Centre, Dakshinkali-3, Kathmandu, Nepal. The pig farm is going to establish a 15m<sup>3</sup> large biogas plant in its own compound. The project is supported by AEPC/NRREP.

## **2. Description of Subproject and Location**

The project lies in Dakshinkali-3, Kathmandu district. Locally, the subproject is proposed to be constructed within the pig farm. The proposed site of construction is in the proximity of pig farm. The distance to the nearest market, Balkhu Chowk, is approximately 19 km. Approximately 45 m<sup>2</sup> land will be required to construct proposed biogas plant. The constituents of the biogas plant will be inlet, digester, outlet and two compost pits.

The GPS location of the project site is:

**Latitude** : 27°37'1954"N  
**Longitude** : 85°17'3225"E  
**Altitude** : 1268m



**Figure: Location Map of proposed project**

A capacity of 15m<sup>3</sup> biogas plant is proposed to install in Dibya Integrated Agriculture Production Centre. The gas produced by the plant will be 3.6m<sup>3</sup> per day. The plant will produce 143 kg of slurry per day which will be stored in compost pit to make 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 pig 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 shall be used for thermal process only.

### **3. Relevancy of preparing ESMP**

This Environmental and Social Management Plan (ESMP) has been done for the proposed project in order to mitigate the likely environmental impacts predicted during environmental and social screening. Any land acquisition or displacement of inhabitations will not be involved in the sub project intervention. The negative impacts are not predicted since the project itself reduces wastes and use of waste in order to produce energy. However, negligible impacts identified during screening process might prevail during construction and operation phase. This project is classified as “Category C”, which means there is minimum environment 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 Bagmati river at a distance of about 100 metre only. The meteorological data from 2008 to 2014 indicated that the region (Kathmandu) has mean annual maximum temperature is about 34°C and minimum temperature is about 0°C. The total annual rainfall received by the station in 2014 was 1146 mm with maximum 24hr rainfall as 69 mm. The land-use pattern of the project area indicates of more agricultural land and less settlement.

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

During feasibility study of Dibya Integrated Agriculture Production Centre, 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**

Considering benefit to the community, there seems no any direct advantage whereas, from the owners view there seems to be some benefit creating job opportunities to some extent during construction phase. The project will provide renewable energy to the farm. The gas produced will replace about 15.3 kg of firewood consumption per day.

##### **5.2 Adverse impact**

There will be no any major adverse impact to the surrounding community and environment. During construction phase, some minor impacts may be seen such as dust pollution, increased noise level 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 are:-

- a. Worker health from dust inhalation during excavation and construction work.
- b. Pit waste material transport and disposal
- c. Increased noise due to construction activity
- 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. Possible intrusion of slurry into nearby river (Bagmati)
- b. Ground water pollution due to leakage of slurry liquid.
- c. Infection of pathogens during slurry handling
- d. Foul smell due to slurry around surrounding community, during extreme temperature and windy day.
- e. Accidents associated with firing and explosion.
- f. Spreading of disease 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:

## ENVIROMENTAL & SOCIAL MITIGATION MEASURES

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"> <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>Minor</li> <li>Minor</li> </ul>	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"> <li>Minor</li> </ul>	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 one week in advance and will be done in consultation with locals	Minor	Construction contractor	Construction activities at site and connection line begin	Construction activities at site and connection line end
Construction	Construction related accidents (Health and safety issue)	<ul style="list-style-type: none"> <li>Precautions need to be followed in every steps.</li> <li>Presence of First Aid kit in the work site.</li> </ul>	<ul style="list-style-type: none"> <li>Minor</li> </ul>	Construction Contractor	Construction of pit begins	Construction of pit begins

Operation	Possible Intrusion of Slurry into the Bagmati River	<ul style="list-style-type: none"> <li>Compost pit will be constructed as per the design and the cost given in BOQ.</li> <li>Periodic monitoring of the plant and checking for leakages and recitification.</li> </ul>	<ul style="list-style-type: none"> <li>Cost of compost pit already included in BoQ and construction cost.</li> </ul>	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 due to the surface and subsurface flow of slurry liquid	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
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 equipments 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
Operation	Accident associated with firing and explosion	As methane is combustible gas, naked flames shall be avoided strictly near digester area. Care shall be taken during use of biogas.	Minor	Client	Till the project runs	Till the project runs
Operation	Flies and mosquito breeding, due to slurry	Avoiding waste water pits near project area	Minor	Client	Till the project runs	Till the project runs

**ENVIROMENTAL & SOCIAL 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>
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Construction	Worker health  Dust levels	At construction site	Visual: Worker wearing equipment  Dust visible	Weekly: random times  Weekly, more frequently during dry, windy weather	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 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 flow of slurry liquid	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
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.
Operatio	Flies and mosquito breeding, due to slurry	Nearby farm area	Physically seen	Weekly	Minor	Client	Project operation phase	End of project operation phase

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#### **4. 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