

# Environmental Due Diligence Report

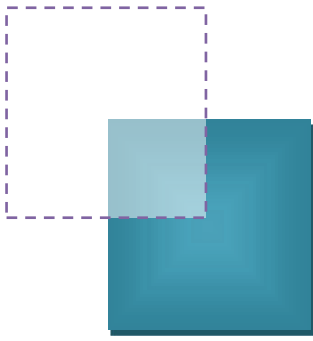
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November 2016

## BAN: Financing Brick Kiln Efficiency Improvement Project – Farmland Green Auto Bricks Limited

Prepared by Bangladesh Bank for the Asian Development Bank

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# **Environmental Due Diligence Report Farmland Green Auto Bricks Limited Gorta, Bhabanipur, Sherpur, Bogra**

**November 2016**

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## Acronym

ADB	-	Asian Development Bank
BB	-	Bangladesh Bank
DoE	-	Department of Environment
IEE	-	Initial Environment Examination
ECC	-	Environment Clearance Certificate
EMP	-	Environmental Management Plan
ESDD	-	Environmental Safeguard Due Diligence
ESIA	-	Environmental and Social Impact Assessment
ESMS	-	Environmental and Social Management System
OHS	-	Occupational Health & Safety
SPS	-	Safeguard Policy Statement
REA	-	Rapid Environmental Assessment

# **DUE DILIGENCE REPORT on ENVIRONMENTAL SAFEGUARDS**

## **1.0 Subproject Title**

The subproject Managing Director, Md Shahin Hossain of Farmland Green Auto Bricks Limited (FGABL) is planning for establishing a fully automatic gas fired (Coal Gasification system) tunnel kiln. The subproject is located at Gorta, Bhabanipur, Sherpur, Bogra. The general information of FGABL are furnished in Table-1A

**Table-1A General Information on Farmland Green Auto Bricks Ltd**

1. Name of the Company	Farmland Green Auto Bricks Limited
2. Name of the entrepreneur	Md Shahin Hossain
3. Contact Address	Gorta, Bhabanipur, Sherpur, Bogra
4. Name of the Brick Kiln	Farmland Green Auto Bricks Limited
5. Type of the Brick Kiln	Gas Fired Tunnel
6. Project Investment	Approx BDT 525.23 million
7. Location Address of the Brick Kiln	Gorta, Bhabanipur, Sherpur, Bogra
8. Current office address	Room # 203, 33/1 KM Shafiullah Road, Green Road, Dhaka
9. Telephone/Fax	8801766693279
10. E-mail	<a href="mailto:Shahin.ibfl@yahoo.com">Shahin.ibfl@yahoo.com</a>

## **1.1 Sub-project Description**

The sub-project is aimed toward setting-up a gas fired (through coal gasification process), automatic clay brick manufacturing facility. The sub-project envisages producing high quality clay products which includes Solid/Perforated Clay Bricks, Facing Bricks as well as Roof Tiles and Pavers in the future to meet the domestic demand.

### **Gas Fired Tunnel Kiln with Gasification System**

Fully automatic gas fired tunnel kiln is the latest in tunnel kiln technology. The kiln is equipped with automatic sensors, controllers and monitors enabling it to precisely measure the internal temperatures, moistures and other factors affecting product quality. Gas gives more flexibility in controlling the firing system.

In this technology, coal gasification system is adopted to produce gas from coal as an alternative source of energy. Coal gasification is a very old yet proven and clean technology, widely used in the developed world where natural gas is scarce or unavailable.

#### Key Technology Facts:

- 3 Stage Clay Processing
- Semi-Stiff Extrusion
- Double Setting
- Fully External Firing

#### Clay Refining

The choice of method of clay refining will depend on the depth, thickness, hardness and physical geology of the clay beds. The usual method for refining clay (extracting from the quarry) is once or twice a year by heavy plant machinery, whether it be excavators, back actors etc. to stockpile large amounts. The advantage of bulk refining is that it can take place during good weather, a large reserve close to the factory means that breakdown of quarry plants is not critical to the production schedule. The layering of the stockpile from large reserves helps to eliminate localized variations in the clay strata. Laboratory testing of the clays from different parts of the quarry determine the likely characteristics of the layers and clay is mixed according to the required properties of the finished item.

In this technology, a total of around 16,000 m<sup>2</sup> open shade has been designated as a primary clay quarry where about 4-6 months equivalent clay maybe stored. This will work as primary aging.

#### 3 Stage Clay Preparations

Clay preparation methods may have to accommodate the physical characteristics of the raw material and special provision may have to be made to deal with certain impurities. Preparation consists of transforming the clay rock in to plastic moldable material by a process of grinding and mixing with water. A typical factory might have a primary crusher; which are used to break down large lumps of rock to manageable size, which can then be fed to a secondary crusher, for example Pan Mill, where the clay is reduced in size further. Water can be added here or maybe added later. Further crushing takes place through conveyor rollers reducing the clay particles to about 0.5 to 1 mm.

In this project a three stage clay preparation has been considered. In the first stage, the clay is grinded with a roller gap of 2~5 millimetres and mixed with water in a double shaft mixer. After mixing, the clay is kept to rest for 4 days for further aging. In the second stage the aged clay is grinded once

again with a roller gap of 2~5 millimetre and mixed with water in a double shaft extrusion mixer. Again the clay is kept to rest for 4 days. Later in the third stage, the clay is again grinded and passed through extrusion mixer. The three stages of clay processing ensure increased plasticity and homogeneity of clay which in turn ensures good physical quality of finished products.

### Extrusion Process

The clay body is mixed to a fairly stiff texture and is then loaded into a powerful vacuum extruder where a worm screw pushes it along a barrel into a vacuum chamber which compresses it through a taper and out through a die. The die is machined to a precise size and shaped larger than the finished size of the brick, calculating how much the clay will shrink during the drying and firing process. The clay emerges as a continuous brick shaped column. Initially this is smooth but it can be modified by removing a thin silver from the top and sides using a tough wire to produce a 'wire drag' effect or by placing textured rollers over the column to create a rusticated effect or even by blasting the column with sand. The clay column is then cut into single bricks and palletized to be ready for the dryers.

### Drying Bricks

Before the bricks can be fired, as much moisture as possible must be removed or the moist pores will explode in the kilns during firing. Drying involves the removal of water from the wet brick in such a way as to dry them out evenly from inside out. If the outer skin of the brick dries first it becomes impossible for moisture to escape. In the kiln the extreme temperature will force out this moisture and some cracking may occur. To prevent this happening the dryers are kept at temperature of about 800 to 1200° C and the temperature is very humid keeping the exterior of the brick as moist as possible. This is monitored very closely to reduce surface cracking. The bricks will shrink in the dryers as the clay particles come together and they become strong enough to be stacked, but at this stage they have no weather resistance qualities. Drying schedule varies but between 18 and 50 hours is typical for an automated plant. Special shapes and large units can take up to a week or more. The dry bricks are then set on to kiln cars for firing ready.

In this technology it is ensured that none of the green bricks touch each other. Pallet loading system ensures that each brick is set on a pallet separately and each pallet is placed on each layer of the drying car frame. The car is then pushed inside the dryer for drying. This way the hot drafts are properly channelled to each brick. Cone type fan is also used evenly to distribute the hot air vertically. At this stage, only 3~4% moisture remains in the green bricks. Notably, the dryer would use the exhaust heat from the cooling zone of the Firing kiln which would not only cool the finished bricks



sooner but also use the exhaust heat while reducing the heating cost for the dryer.

### Pre- Heating

After the green bricks are dried cars come out of the drying chamber. The dried green bricks are unloaded from the drying cars and again loaded into a kiln car. Green bricks pass through the ambient weather for a significant amount of time since it came out of the dryer until it enters the tunnel kiln. During this time some moisture may be absorbed by the green bricks. To ensure that moisture no more than 4% is left in green bricks, the kiln car first passes through a pre-heating kiln.

### Brick Firing

Firing temperature varies considerably between different clay types and is often quite critical. During firing, bricks undergo a physical change. Clay particles and impurities are fused together to produce a hard durable and weather resistant product. This is called vitrification. This is usually accompanied by further shrinkage and a color change. The length of time of firing and the rate of firing to a large extent depends on how much mechanical water; combined water and carbonaceous matter are present in the brick. It also depends on the particle size of the clay and denseness of the bricks, on the size of the products and on the closeness or density of the setting but maximum firing temperatures for building bricks range from about 1050° C to 1260° C. The firing of the brick in both Hoffmann Kilns & Car Tunnel Kilns is generally considered in four stages because of the very different conditions in each:

a) Water-Smoking or slow heating stage: During the water-smoking period the mechanical water must be slowly driven off from the goods set in the kiln. This drying must be done carefully. The temperature in the kiln is gradually increased and it is not until a temperature of about 120° C. As the bottom of the setting has been reached, it is considered that drying is complete and the next stage of the firing can start. The crown temperature in the kiln at this time may be 250° C to 300° C. The water smoking period may last from three to four days up to a fortnight or more, depending on the percentage of mechanical water in the goods, the nature of the clay, the type and the size of the goods. The water smoking stage, from 200° C to 300° C during which the mechanically held water is removed.

b) Preheating or Getting-up stage: During this period the temperature is raised to about 950° C and two most important reactions take place; the carbonaceous matter is oxidized from the ware and the chemically combined water is driven off. The removal of chemically combined water from the clay may start at 400° C to 450° C and carry on to 650° C but traces may continue to be given off until 850° C to 900° C is reached.

c) Full Firing: As soon as all the carbonaceous matter has been burnt out and the iron oxidized, the temperature can be raised rapidly from 900° C which is the temperature at which firing starts for some clay, to the finishing temperature, that is the highest temperature the goods can withstand without distortion or excessive shrinkage. The strength of the goods is increased in this period, first by sintering of closely adjacent particles of clay together and later at higher temperature by some of the constituents of the clay, known as fluxes, melting to a liquid and coating the more solid particles which it binds together when the ware in the kiln is cooled. The amount of fluxing and the temperature at which it takes place depends on the amount of the so-called fluxing oxideferrous oxide, lime, magnesia, soda and potash that are present in the clay.

Different clays have different finishing temperature i.e. temperature set which refers the properties, such as strength, water absorption; porosity, etc. For building bricks the range usually varies from 950° C to 1050° C. It is during this period of the firing that the kiln atmosphere must be controlled to suit the product being fired. This is necessary to obtain the required color or finish of the product.

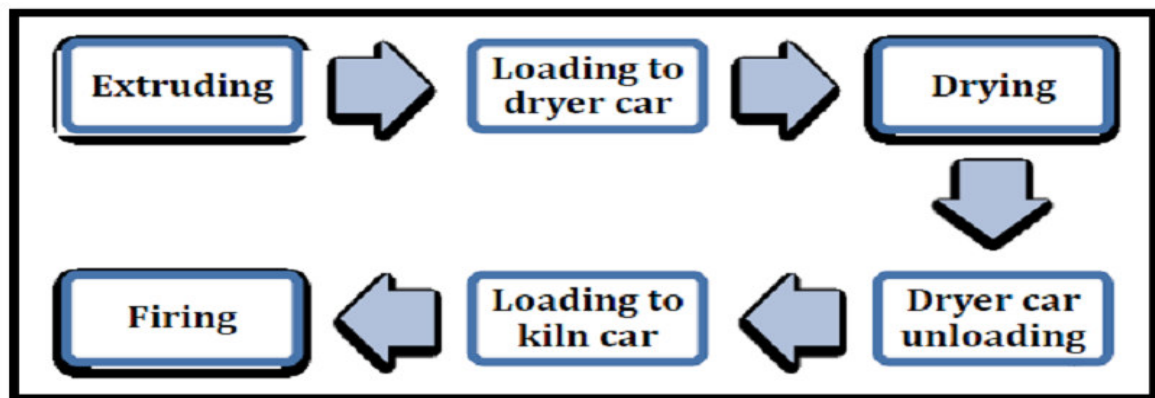
Cooling Stage: After firing, the product is allowed to cool gradually over a period of 3-4 days or more. After the fire have burnt down after that last coal charge to the fire holes, the stack damper is usually lowered and the top firing hole to the fire mouths bricked and clayed up. After 1-2 days the crown cooling holes are gradually opened and then in the next few days the wicket gradually broken down and may be the fire mouths uncovered.

## Coal Gasification

Coal gasification is the process of producing syngas—a mixture consisting primarily of methane (CH<sub>4</sub>) carbon monoxide (CO), hydrogen (H<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and water vapor (H<sub>2</sub>O) – from coal, water, air and/or oxygen. Historically, coal was gasified using early technology to produce coal gas (also known as "town gas"), which is a combustible gas traditionally used for municipal lighting and heating before the advent of industrial-scale production of natural gas. In current practice, large-scale instances of coal gasification are primarily used for electricity generation, such as in integrated gasification combined cycle power plants, for production of chemical feedstock or for production of synthetic natural gas. In this project, a modified version on coal gasification system is used. After syngas is produced, it is purified to remove dust, tar and Sulfur and then sent to the tunnel kiln for burning. Compared to direct coal burning, gas burning through coal gasification is much cleaner with very low emission level and thus environment friendly.

## Green Brick Double Setting

Considering the clay type available in Bangladesh and other factors of production it is preferable to use double setting method, meaning that the green bricks have to be loaded in the pallet and drying car first time, whether manually or using robot arms, after extrusion. After drying, the green bricks have to be unloaded from the drying car and loaded for the second time on to the kiln car for burning.



For loading and unloading, the subproject plans to use manual handling process using powered hoist and a set of gantry effortless manipulation. The process eliminates involvement of heavy and expensive robotic arms while increase use of a few labors. However, there's provision for usage of staking machine or similar equipment which maybe included later after the project's operation.

**The plant will daily produce approximately 120,000 Clay Solid Bricks / Perforated Bricks (25% void max) and 6,000 Square Meter of Facing Bricks of size 250 mm x 125 mm x 75 mm and 250 mm x 125 mm x 15 mm respectively.** Tunnel kiln technology considered to be most advanced brick making technology, currently being used in the country and one of the prescribed technologies under the Brick Kiln (Control) Act 2013<sup>1</sup> along with zigzag, hybrid Hoffman, vertical shaft technologies. The emissions of particulate matters are 80% lower in tunnel kiln than the Traditional kiln<sup>2</sup> because of better combustion.

**The proponent owns 7.07 acres of land for the establishment of the kiln and other ancillary facilities.** The project site is at Gorta, Bhabanipur, Sherpur, Bogra (Latitude: 24°36'04"N Longitude: 89°26'28" E) and agri-land surroundings with no housing. No school, sensitive installation including archaeological site around. It is about 07 kilometres far from Sherpur Upazila head Quarter, 27 Kilometres from Bogra District

<sup>1</sup> [http://www.dpp.gov.bd/bgpress/index.php/document/get\\_extraordinary/6456](http://www.dpp.gov.bd/bgpress/index.php/document/get_extraordinary/6456)

<sup>2</sup> <http://www.ccacoalition.org/en/resources/factsheets-about-brick-kilns-south-and-south-east-asia>

headquarters. It is bounded by vacant land on the west and the east, on the north Bhabanipur-Bishalpur union connecting road, on the south vacant land. The proposed sub project stands 05 Kilometre right from Highway Road and half Kilometre from Metallic road.

## **1.2 Current Status of Subproject**

All infrastructure facilities like electricity, labour, telecommunication, etc are available at the project area.

The subproject has obtained necessary national and local environmental clearances as well as permits and approvals for project implementation.

Copies of NOC from Union Parishad, (Annexure 2) Site Clearance Certificate from Department of Environment, (Annexure 3) and NOC from Agricultural Officer, (Annexure 4) are annexed for ready references.

Development of sub-project proposed land has started. The proponent is now waiting for the sanction of loan for ground breaking. It has completed the lay out plan, digital survey and design by an independent surveyor. Technical plan and design has also been completed and handed over to the technical consultant.

## **2.0 Relevant Environmental Safeguards Policies and Regulatory Framework**

### **I. National Regulatory Framework**

Bangladesh Environment Conservation Act 1995 is the key Act in the environmental arena. Under this Act, it requires that no industry or project can be set up in the country without the clearance from Department of Environment (DoE). Bangladesh Environment Conservation Rules 1997 provides the procedures how to obtain the environment clearance from DoE. According to this Rule, brick manufacturing projects fall under the "**Orange B Category**". According to ECR 1997, the project sponsor prepared a comprehensive Initial Environmental Examination (IEE) report including an Environmental Management Plan (EMP) and submitted those to DoE for obtaining Site Clearance and Environmental Clearance. **Brick Kiln Act 2013** is the latest legislation that the brick kiln owners has to comply. It regulates the technology and type of the kiln, location characteristics, source of soils/ earth, fuels etc.

## **II. ADBs Safeguards Policy and Requirements**

ADB's Safeguard Policy Statement (2009) is a consolidated policy framework setting out policy objectives, principles and requirements for three safeguard areas: environmental, involuntary resettlement, and indigenous people.

The ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, financial intermediary loans, and private sector investment operations as per Environmental Operational Directives (2013-2020).

Environmental assessment is a process rather than a one-time report, and includes necessary environmental analyses and environmental management planning that take place throughout the project cycle.

## **III. Bangladesh Bank's Commitment**

Bangladesh Bank's cherished goal is to achieve sustainable development in the overall economy. In the energy sector, it promotes cleaner and more environmentally friendly technologies, and thus is committed to avoid and mitigate adverse environmental impacts, if any, resulting from the projects it finances.

Bangladesh Bank has agreed upon with Environmental and Social Management System (ESMS) of ADB and committed that all subprojects financed by BB through ADB Letter of Credit (LC) would be compliant to ADB Safeguard Policy Statement (SPS) 2009.

Currently, Bangladesh Bank is considering to finance the proposed subproject through the ADB LC, therefore an Environmental Safeguard Due Diligence (ESDD) of the proposed subproject has been warranted.

### **3.0 Methodology for Environmental Safeguards Due Diligence (ESDD)**

- The ESDD of the subproject has been carried out in accordance with the guidance provided in the ESMS of ADB under Policy Statement (SPS), June 2009.

#### **Documents Review:**

- Review of all licenses permits obtained in favour of the sub-project.

- Review of feasibility report for the subproject prepared by the entrepreneur
- Desk review of secondary environmental baseline data including air quality, water quality and socioeconomic from authentic and published sources

### **Stakeholder Consultation:**

- Discussions with the sector specific team within Bangladesh Bank, involved in the appraisal and loan processing of the subproject
- Discussions with the subproject proponent, explaining the need and scope of safeguards due diligence, and seek additional information, wherever required.
- Discussion with local people/community during the site visits(**Public Consultation**)

**Site Visit:** In co-ordination with Bangladesh Bank and PFI, field visit was undertaken by Environmental Safeguards specialist, Social Safeguards specialist and Business Development specialist to the subproject site on 14 November, 2016. The representatives of the project accompanied the safeguard specialists to the subproject site and responded to various questions related to technology, likely environmental, economical impacts and scope of employment opportunities etc.

### **4.0 CATEGORIZATION OF SUB-PROJECT**

- A **Rapid Environmental Assessment (REA)** of the subproject using the REA checklist and **environmental categorization** were carried out based on the documents review supplemented by site visits for ground truth verification. The **filled-in REA Checklists and Environmental Categorization forms** are given in **Annexure 1**.
- Based on the filled-in REA checklists and environmental categorization, the subproject can be classified as **Category B**, as the impacts both in construction and operation phase are likely to be limited to subproject site itself and such impacts can be controlled/mitigated through site specific measures.

### **5.0 Due Diligence on Environmental Safeguards**

Based on the documents review, site visit and desk review of secondary data from published sources, **Environmental Safeguards Due Diligence** was carried out. The findings of the due diligence as well as the environmental sensitivity of the subproject are given here under:

### **5.1 Regulatory**

- The sub-project has obtained necessary national and local environmental clearances as well as permits and approvals for project implementation except the Brick Burning License from the Deputy Commissioner's office which is under process. This license will be due during its operation stage.
- The subproject had prepared an IEE checklist (**Annex 5**) as per regulatory requirement and submitted to DoE along with other documents for obtaining environmental site clearance. It may be clarified that the Department of Environment (DoE) recognizes the filled in Initial Environmental Examination (IEE) Checklist as the **IEE document** for the purpose as required for category B projects.
- The subproject will not require/warrant an Environmental and Social Impact Assessment (ESIA) reparation as per regulatory requirement
- The subproject does not fall under the ADB prohibited list of activities given in **Annexure 6**.
- During discussion with the local people, it was observed that they supported the initiative of the proponent and the subproject enjoys the support of the local community. (**Proceedings of the Public Consultation have been provided in Annexure 7**)

### **5.2 Sitting**

- Location alternatives were considered during site selection. This site was chosen because the site enjoys all the utilities, facilities and regulatory requirement for operation of the plant. The site has been an ideal location for setting up a modern brick kiln.
- The subproject is accessible through Bhabanipur road connecting to Dhaka-Rangpur highway.
- From the transportation point of view, the location is also excellent.
- The land use in the vicinity of the project area is mixed. Single crop agricultural lands are surrounded on west, east and south sides of the

subproject and approach road is on the north adjacent to the metallic road. Distant village (3 kms) situated on south side of the subproject site.

- The site has no human habitation or any other impediments. It is almost a barren, fallow land. The project location is shown in different maps and satellite image maps in **Annexure 8a**. The project site related photographs are shown in **Annexure 8b**.
- There is no National Park or Wildlife Sanctuary or ecologically sensitive areas within a radius of 10 km of the project site.
- The subproject site is not reported to be falling along the migrant route any threatened/protected wildlife. Occurrence of rare and/or endangered both flora and fauna (plants, animals, birds & fishes) species has not been reported in and around the subproject area/region.
- No archaeological or historical monuments, protected from the Bangladesh Government have been reported in and around the sub project site as well as within a radius of 10 km. However there are villages, mosques, school located within 5 km radius.
- The subproject draws a plan to collect clay from river ( Karotoa) beds including marshy beels nearby and from suppliers.

### **5.3 Environmental Management Plan (EMP)**

- The sub project shall not have major environmental concerns as it will have an efficient technology for brick burning. However, the sub-project is advised to give importance on regular repair and maintenance of the equipment and machineries. So, monthly maintenance scheduling is advised. It is expected that the emission will be within the limits of GoB standard of 1000 mg/Nm<sup>3</sup>.

However, it will have certain site specific negligible pollution related issues (dust, liquid waste, solid waste and noise pollution) during construction and operation phases, if those issues are not properly addressed. Anticipated concerns and or impacts and likely mitigation measures to contain them are described as **Environment Management Plan (EMP)** in the following table.



Project Phase	Concerns and/or likely Impacts	Response measures
Plant Location/ Pre-construction Phase	Land Acquisition	The proposed project didn't require any relocation of homestead and land acquisition as the proposed plant would be set up on the land own by the proponent. <b>So no impact</b>
	Loss of and displacement from agricultural land	The land is barren & fallow in nature. No mitigation measures needed in this regard.
	Disruption to drainage pattern	Project will not create any water logging and drainage problem as the land of the project will have well design drainage facility.
	Change in Landscape	It is implicit that the project will have a modern architectural view. Green belt and afforestation around the project should turn the altered green area into good landscape.
Construction Stage	Worker accident	<ul style="list-style-type: none"> <li>Regular inspection on work safety and maintenance of equipment</li> <li>Environmental health and safety briefing periodically</li> <li>Provision of protective gear</li> </ul>
	Sanitation diseases hazard	<ul style="list-style-type: none"> <li>Provide proper sanitation facilities</li> <li>Supply safe drinking water</li> </ul>
	Dust/air pollution	<ul style="list-style-type: none"> <li>Carrying clay in covered vans, lorries</li> <li>Arrangements for water spraying in dust generating areas</li> <li>Paving of the unpaved <i>kucha</i> (earthen) roads</li> </ul>
	Noise/vibration hazard	<ul style="list-style-type: none"> <li>Avoiding the use of construction equipment producing excessive noise during peak hours and also at night as much as possible</li> <li>Maintaining equipment in good working condition</li> <li>Creation a buffer zone</li> </ul>
	Traffic congestion	<ul style="list-style-type: none"> <li>Scheduling of transportation may be done in consultation with local communities.</li> <li>Speed reduction provision in critical</li> </ul>

Project Phase	Concerns and/or likely Impacts	Response measures
		areas and road turns ○ Use of safety road symbols, if required
Operation Stage	Pollution from liquid waste discharge	○ The Proposed plant will not create any process liquid from the production process, so, mitigation suggestion is not required. The domestic liquid waste to be disposed through a septic tank with a soak pit.
	Pollution from dusts	○ Carrying clay and finished materials (bricks/chips) in covered vans, lorries. ○ Arrangements for water spraying in dust generating areas including in the clay shed ○ Plantation in the surrounding of the plant ○ Paving of the unpaved <i>kucha</i> (earthen) roads
	Pollution from solid waste	○ Segregation of solid wastes ○ There will be some solid wastes as waste clay, misshaped or broken under burnt or over burnt bricks, but these have secondary demand as by product to be sold to the traders.
	Emission of Particulate Matters (PM) and flue Gases (Sulphur Oxide SO <sub>2</sub> , Nitrogen Oxides NO <sub>x</sub> , Carbon monoxide, CO)	○ Optimal use of high-grade coal ○ Regular maintenance of plant equipment and machineries ○ Use of bottom ash in the green bricks ○ Capacity building of master mason and other workers ○ Regular monitoring of PM, SO, NO <sub>x</sub> , CO
	Coal transportation and grinding	○ Coal storage, unloading and coal grinding facility will have to be done in a closed shed so there is no chance to escape coal dusts.
	Occupational health and Safety	○ Protective clothing, goggles, helmets, shoes and accessories to be provided

Project Phase	Concerns and/or likely Impacts	Response measures
		<p>to the workers especially who will work in the kiln; and need based for other staff and labours</p> <ul style="list-style-type: none"> <li>○ Adverse impact on worker's safety would be minimized by implementing an occupational health program.</li> <li>○ Regular medical check-up will have to be done to ensure the soundness of health of employees and workers.</li> </ul>
	Traffic congestion	<ul style="list-style-type: none"> <li>○ Provision of adequate internal parking for all vehicles coming to the plant premises;</li> <li>○ Paving the dilapidated service road with tarmac or more durable material and speed reduction provision in critical areas and road turns</li> <li>○ Use of safety road symbols if required</li> </ul>
	Noise hazard	<ul style="list-style-type: none"> <li>○ Maintaining equipment in good working condition and where appropriate using noise suppressors, mufflers and acoustic hoods etc.</li> </ul>

- The subproject shall create a good employment opportunities for men and women in the locality.

## 6.0 Further Actions Required

The ESDD indicated the requirement of following further actions for the subproject:

- The proponent has to obtain **Environment Clearance Certificate (ECC)** from Department of Environment and **Brick Burning License** from Deputy Commissioner's office prior to go for commercial operation
- The proponent has to **open LC to import of machineries after the review of Technical plan and Design by the ADB technical consultant**
- The proponent has to construct the kiln and dryer as per approved design.

- The proponent has to implement an **Environmental Management Plan (EMP)** for mitigating site specific impacts for the construction phase and operation phase, **in line with the suggestions provided in 5.3 and in fulfilling the conditions stipulated in the Site Clearance of DOE** as well as loan covenant of BB.
- The proponent has to prepare **Occupational Health & Safety (OHS) Plan**, in line with the suggestions provided in 5.3 and in fulfilling the conditions stipulated in the site clearance of DOE as well as loan covenant of BB.
- The proponent has to ensure **deployment of adequate human and financial resources** for on-site environmental management and comply with all consent conditions stipulated in the Site Clearance and Brick Burning license from the District Commissioner in a timely manner, document and submit annual regulatory compliance reports to ADB as well as quarterly progress reports to Bangladesh Bank (BB).
- The proponent has to **allocate a budgetary provision** for the environmental management plan including a periodical environmental monitoring program for the operation phase.
- During the conduct of safeguards due diligence, the project proponent has **consented to allot a budgetary provision** for environmental management as per Site Clearance requirements of DoE and BB's loan covenant.
- The Proponent has to develop and improve Landscaping, green belt, afforestation during operational phase
- The **ESMS cell at BB will require monitoring implementation of the environmental management plan** through developer's periodic environmental monitoring progress reports and undertaking bi-annual due diligence visits to ensure satisfactory implementation of environmental management plans at all stages of subproject.

## 6.1 Suggested and Monitoring Plan

The proponent is suggested to develop arrangements for regular monitoring of air quality and occupational health issues during construction and operational phase in accordance with the suggested plan in table 6A & 6B.

**Table 6.A Environmental Monitoring Plan during construction phase of the project**

Issue	Parameters	Location	Monitoring Frequency
Ambient air Quality	PM <sub>10</sub> , PM <sub>2.5</sub> *	Around the project site within 500 meters	Data from DOE Continuous Air quality Monitoring Stations (CAMS) in the air shed can be used
Groundwater	Groundwater level, pH, TDS, Ammonia, Nitrate, Phosphate, Arsenic (As), Iron (Fe), Manganese (Mn) and Coliforms	At the project site	Once
Construction waste	Solid waste/construction debris, visual observation and record check	At site	Once a month
Health	Health status of the workers, visual observation and record check	At site	Once every 2 months by the proponent's appointed health professional

\*PM<sub>10</sub> – Particulate Matter 10 micrometers or less in diameter, PM<sub>2.5</sub> – Particulate Matter 2.5 micrometers or less in diameter, pH – Hydrogen ion concentration, TDS – Total Dissolve Solids

**Table 6.B: Environmental Monitoring Plan during operational phase**

Phase	Environmental parameter	Sampling Location	Testing Parameter	Frequency
<b>Operation Phase</b>	Ambient Air Quality	Project site at Gorta, Bhabanipur, Sherpur, Bogra	Suspended Particulate Matter (SPM), PM <sub>10</sub> and PM <sub>2.5</sub>	Bi-annual (routine) analysis
	Stack Emissions	Project site at Gorta, Bhabanipur, Sherpur, Bogra	SO <sub>x</sub> , NO <sub>x</sub> and CO	Bi-annual (routine) analysis

Phase	Environmental parameter	Sampling Location	Testing Parameter	Frequency
	Drinking water	Project site at Gorta, Bhabanipur, Sherpur, Bogra	As, Total hardness, Bacterial total count, E.Coli	Bi-annual basis in each year (pre-monsoon and post-monsoon)
	Noise	At four corners of Project boundary, generator room etc.	Hourly basis for 24 hours	Quarterly (routine) analysis

## 6.2 Reporting Requirement

As a part of environmental and social compliances, the sub project will submit quarterly EHS compliance report of the Project to PFI & Bangladesh Bank (BB). This report will contain the analysis of testing various environmental parameters during monitoring phase. It will also describe in detail about the status of implementation of environmental management plan (EMP).

**Table 6.C: Reporting schedule**

Reporting entity	Frequency of Report	Entity to whom the report
Manager of the plant	Quarterly EHS Compliance Report including the implementation status of EMP	Management of Farmland, PFI, BB
PFI, BB	Annual ESDDR Report based on the findings of half-yearly monitoring of the plant based on the EMP	ADB

## 6.3 Suggested Maintenance Schedule

It is suggested that a schedule of maintenance of kiln, dryer, generator and all other machineries shall be devised and carried out accordance of the respective equipment and be reported along with the monitoring report. Skill workers are also required to be deputed in the operation of the machineries and equipment.

## **7.0 Conclusion and Recommendations**

The conclusions of the ESDD for the subproject are:

- The subproject has been primed by the proponent as per their own investment plan supplemented by ADB's loan proceeds through BB.
- The construction and operation of Brick Kiln project at the proposed site has no major significant environmental issues. The subproject is expecting their trial production by June 2017
- BB, through its Sustainable Financing department, is committed to monitor the implementation of Environmental and Social Management Plan at subproject site through proponent's periodic progress reports and undertake bi-annual due diligence visits to subproject site and assess the implementation of environmental management and environmental monitoring being carried out by the proponent.
- The subproject will be in compliance to ADB Safeguard Policy Statement (SPS) 2009 and does not pose reputational risk to ADB funding on environmental safeguards
- The proponent is considered as a qualified subproject for ADB financing, from environmental aspect.