AAC BLOCKS PROJECT BY MOHIT INDUSTRIES LIMITED

NXTBLOC
AUTOCLAVED AERATED CONCRETE BLOCKS

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Document Prepared By First Climate (India) Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Mohit Industries Limited (hereinafter referred to as MIL or PP) has installed an autoclaved aerated concrete (AAC) blocks manufacturing unit of capacity 300,000 m^3/annum in Gujarat, India. The project activity involves setting up a new facility and is accordingly classified as a Greenfield project. The AAC blocks manufactured at the project plant would use waste material fly ash generated from thermal power plants as the primary raw material. The AAC blocks produced would replace conventional fired (baked) clay bricks as construction material.

The specific energy demand for manufacturing AAC blocks is lower as compared to conventional clay bricks. The energy requirement for fired clay bricks manufactured in India is supplied predominantly by high carbon intensive fossil fuel sources. AAC blocks are manufactured by the autoclaving process, which is less energy intensive as compared to the thermal baking process used for manufacturing of fired clay bricks. Thus, the project activity results in lower greenhouse gas emission as compared to the conventional clay bricks manufacturing process.

In terms of performance standard of AAC blocks, the AAC blocks are being manufactured in compliance with the requirements of the relevant national standard. The project would result in average greenhouse gas emission reduction of around **39,949** tCO_2e/ annum.

1.2 Sectoral Scope and Project Type

The project activity is a non AFOLU project, developed in line with UNFCCC approved CDM methodology. With reference to Appendix B to the simplified modalities and procedures for small scale CDM project activities, the project activity falls under the following category:

Type (iii): Other project activities
Scale: Small Scale
Category Z: Fuel switch, process improvement and energy efficiency in brick manufacture
Methodology: AMS-III.Z: Fuel Switch, process improvement and energy efficiency in brick manufacture (Version 04)

The project is not a grouped project.

1.3 Project Proponent

Organization name	Mohit Industries Limited
Contact person	Mr. Manish Narayan Saboo
Title	Director
Address	A/601-B, International Trade Centre, Majura Gate, Ring Road, Surat, Gujarat, 395 002, India
Telephone	+91 261 2463261
Email	Manishsaboo84@gmail.com

Organization name	First Climate (India) Private Limited
Contact person	Mr. Subhendu Biswas
Title	Director
Address	3C, Camac Street, 4th Floor, Camac Towers, Kolkata 700 016, West Bengal
Telephone	+91 33 4022 3456
Email	subhendu.biswas@firstclimate.co.in

It has been confirmed that Mohit Industries Limited and First Climate(India) Private Limited are project proponents of the aforesaid Project Activity.

1.4 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the project	Not Applicable
Contact person	Not Applicable
Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.5 Project Start Date

The start date of the project activity is **25-November-2012** which corresponds to the first production start date of the NXTBLOCK Autoclaved Aerated Concrete Block.

1.6 Project Crediting Period

Crediting period start date: 25-November-2012[1]

Crediting period end date: 24-November-2022

Length: 10 years 00 months

[1] *The crediting period has been finalised based on the production start date of the NXTBLOC Autoclaved Aerated Concrete Block. The supportive has been provided to the VVB*

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	Yes
Large project	NA

Years	Estimated GHG emission reductions or removals (tCO_2e)
25/11/2012 to 24/11/2013	39,949
25/11/2013 to 24/11/2014	39,949
25/11/2014 to 24/11/2015	39,949
25/11/2015 to 24/11/2016	39,949
25/11/2016 to 24/11/2017	39,949
25/11/2017 to 24/11/2018	39,949
25/11/2018 to 24/11/2019	39,949
25/11/2019 to 24/11/2020	39,949
25/11/2020 to 24/11/2021	39,949
25/11/2021 to 24/11/2022	39,949
Total estimated ERs	399,490
Total number of crediting years	10
Average annual ERs	39,949

1.8 Description of the Project Activity

The primary technology for the AAC block manufacturing at the project plant is from M/s Changzhou Mingjie Building Material Equipment Manufacturing Co., Ltd, China. The blocks would be manufactured, largely through mechanical processes, using cement, lime, gypsum and fly ash from thermal power plants as major raw materials along with aluminium powder (in small quantities).The batched raw materials are mixed with water and the slurry formed is fed to the moulds to set and form green cakes. The green cakes are finally cured by autoclaving with steam to form the AAC blocks. Steam is generated in coal fired boiler.

The project activity product, i.e. AAC blocks, consume lower amount of energy for production in comparison to the energy required for producing ordinary fired clay bricks. The fuel source for the thermal energy (steam) required for the project activity is presently coal, while the state grid primarily supplies electrical energy for the project. Thus, the project activity results in GHG emission reduction by saving extra quantity of fossil fuel, which would have been required by an ordinary fired clay bricks manufacturing plant of equivalent capacity.

The major components of equipment installed as part of project activity are as follows:

- Raw materials storage silos
- Raw material mixer
- Hydraulically operated moulding section
- Autoclave section
- Steam boilers
- Compressed air network
- Internal transportation system

Specifications of AAC blocks manufactured under the project activity are as follows:

Particulars	Unit	Value	Remarks (if any)
Dimension of AAC blocks	**Mm**	**650X240X150**	**As per actual production data**
Density (dry)	**kg/m3**	**551-600**	**As per Lab test Report**
Dry shrinkage (maximum)	**%**	**0.1**	**As per Indian Standard – IS 2185**
Thermal conductivity	**W/m-K**	**0.24**	
Compressive strength	**N/mm2**	**>3.75**	
Fly ash	**%**	**72.11**	**Lab test report and actual monitoring data at the plant**
Cement	**%**	**18.37**	
Lime	**%**	**7.38**	
Gypsum	**%**	**2.06**	
Aluminium powder	**%**	**0.064**	

The estimated lifetime for the project is around 15 years

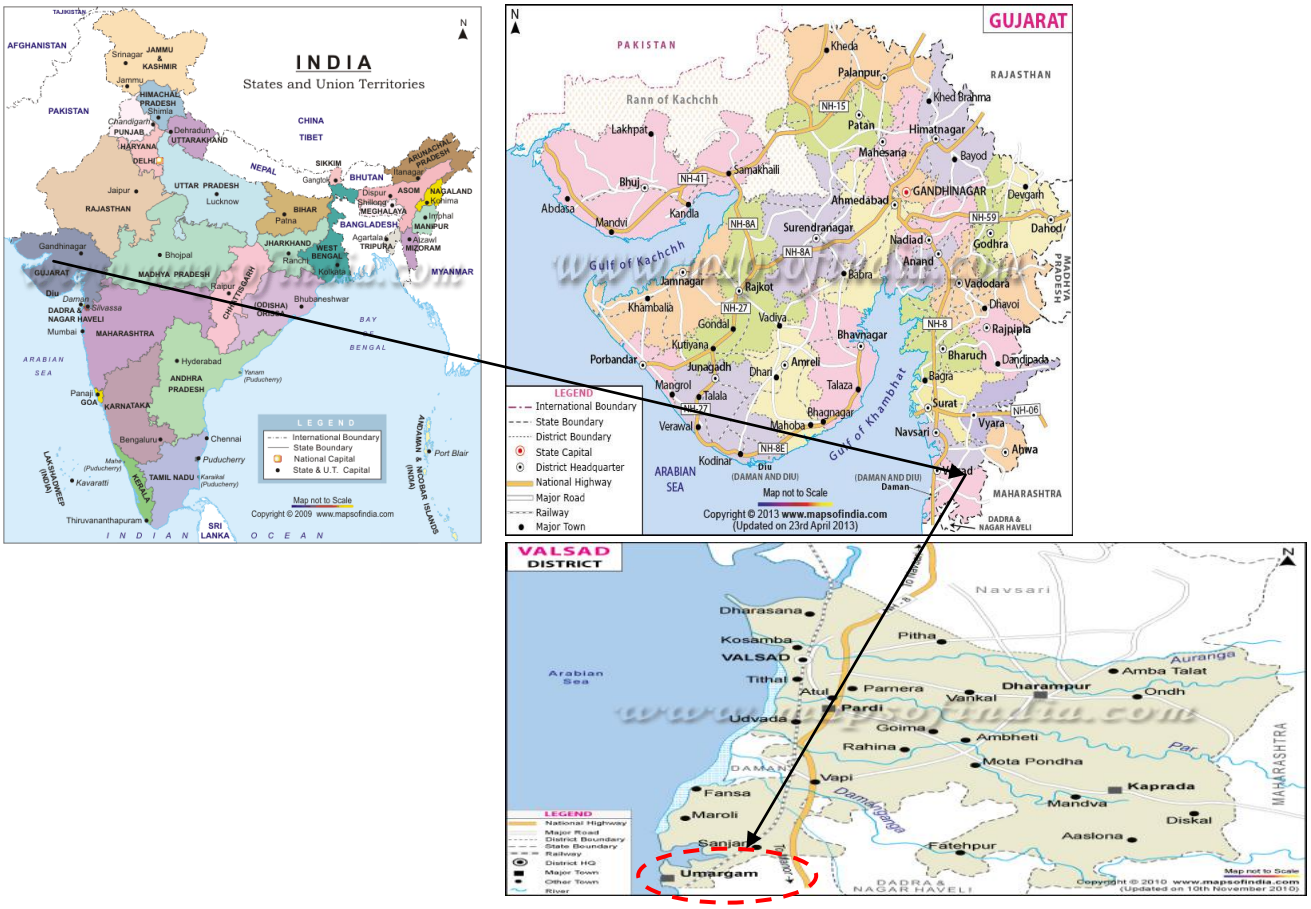
1.9 Project Location

Country: India
Region: Western India
State: Gujarat
District: Valsad
Tehsil/ Mandal: Umargaon
Village: Khatalwada

Geographical coordinates of the project location: Latitude: 20.217° N
Longitude: 72.794°E

Nearest railway station: Surat
Nearest airport: Surat

Indicative map:



1.10 Conditions Prior to Project Initiation

The project is a Greenfield project. The baseline for the project has been established based on national practice across the host nation, India and as per the applicable methodology **AMS-III.Z(Fuel Switch, process improvement and energy efficiency in brick manufacture)-Version 04**

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project obtained all statutory clearances from relevant Indian authorities. The following consents and clearances have been granted by the statutory authorities

Consent/Clearance Name	Date	Statutory Authority
Factory License	17-September-2012	Directorate Industrial Safety & Health
Clearance from District Industries Centre	01-August-2012	District Industries Centre, Valsad(Govt. of Gujarat)
Consent to Establish	18-December-2012	Gujarat State Pollution Control Board
Permission for Erection of Boiler	21-April-2012	Office of Directorate of Boiler
Commissioning of the project activity	25-November-2012	Start date of the production of the NXTBLOC Autoclaved Aerated Concrete

1.12 Ownership and Other Programs

1.12.1 Right of Use

Purchase order of equipment, clearances and land document in name of PP, helps in establishing MIL as owner of credits generated from this project.

1.12.2 Emissions Trading Programs and Other Binding Limits

The project is hosted by India where there is no national level binding limit in brick manufacturing units.

1.12.3 Other Forms of Environmental Credit

The project has not applied for any other credits registration program.

1.12.4 Participation under Other GHG Programs

The project has not applied for registration under any other GHG program.

1.12.5 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is taken up as a stand-alone project.

Leakage Management

Leakage emissions, as identified under the applied methodologies and tools, are being deducted from gross emission reduction generated by the project. Further, the monitoring plan of the project activity includes detailed description of high quality monitoring plan required to collect all leakage related data.

Commercially Sensitive Information

No portion of the information contained in this document is considered to be publicly sensitive by MIL.

Further Information

No additional consideration required.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The project has been developed using the following baseline and monitoring methodology approved under CDM program of UNFCCC:

Methodology: AMS-**III.Z. Fuel Switch, process improvement and energy efficiency in brick manufacture**[2]

Version no. 04

2.2 Applicability of Methodology

Compliance of project activity with applicability criteria 1 to 12 has been demonstrated below:

Applicability Criteria	**Compliance by project**
The methodology comprises one or more technology/measures listed below in brick production facilities: • Shift to an alternative brick production technology/process; or • Complete/Partial substitution of fossil fuels with renewable biomass (including solid biomass residues such as sawdust and food industry organic liquid residues);or • Complete/partial substitution of high carbon fossil fuels with low carbon fossil fuels	Applicable and fulfilled: The project comprises shift to an alternate brick production technology at a Greenfield site. The term shift has been used in context of the baseline scenario or the common practice scenario for brick manufacture in host country.

[2] http://cdm.unfccc.int/methodologies/DB/WPNWYRJ0FN59EFPA4A7NABU0849FD3

Complete or partial fuel substitution and associated activities may also result in improved energy efficiency of existing facility; however project activities primarily aimed at emission reductions from energy efficiency measures shall apply AMS-II.D "Energy efficiency and fuel switching measures for industrial facilities". Thus, the methodology is applicable for the production of: (a) Bricks that are the same in the project and baseline cases; or (b) Bricks that are different in the project case versus the baseline case due to a change(s) in raw materials, use of different additives, and/or production process changes resulting in reduced use or avoidance of fossil fuels for forming, sintering (firing) or drying or other applications in the facility as long as it can be demonstrated that the service level of the project brick is comparable to that of the baseline brick. Examples include pressed mud blocks (soil blocks) with cement or lime stabilization and other 'unburned' bricks that attain strength due to fly ash, lime/cement and gypsum chemistry.	Not Applicable: The project was not implemented at an existing facility.
The measures may replace, modify, retrofit systems or add capacity to systems in existing facilities or be installed in a new facility.	Applicable and fulfilled: The project has been implemented at a new facility.
New facilities (Greenfield projects) and project activities involving capacity additions are only eligible if they comply with the requirements for Greenfield projects and capacity increase projects specified in the "General Guidelines for SSC CDM methodologies".	Applicable and fulfilled: The project activity plant is a Greenfield unit and it complies with the related and relevant requirements of the General Guidelines for SSC methodologies. Paragraph 19 of General Guidelines for SSC CDM methodologies, version 17, has been applied to determine the most plausible baseline scenario for the Greenfield project activity. In line with the guidance, the baseline alternative to the project activity has been selected through a step-by-step approach as provided in the guidelines.

The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General Guidelines for SSC CDM methodologies". If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e. the time when the affected systems would have been replaced in the absence of the project activity.	Not applicable: The project activity is not a replacement or retrofit to an existing facility. In fact, it is being implemented as a Greenfield project.
For existing facilities, it shall be demonstrated, with historical data, that for at least three years immediately prior to the start date of the project implementation, only fossil fuels (no renewable biomass) were used in the brick production systems that are being modified or retrofitted. In cases where small quantities of biomass were used for experimental purposes this can be excluded.	Not applicable: The project activity is not being implemented at an existing facility.
The renewable biomass utilized by the project activity shall not be chemically processed (e.g. esterification to produce biodiesel, degumming and/or neutralization by chemical reagents) prior to the combustion but it may be processed mechanically (e.g. pressing, filtering)/thermally (e.g. gasification to produce syngas).	Not applicable: The project activity does not involve use of biomass.
In cases where the project activity uses crops from renewable biomass origin as fuel, the crops should be cultivated at dedicated plantations and the following conditions shall be met: (a) The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the proposed project activity can continue to provide at least the same amount of goods and services as it would in the absence of the project; (b) The plantations are established on land that: i. Was classified as degraded or degrading at the start of the project implementation, as per the "Tool for the identification of degraded or degrading lands for consideration in	Not applicable: The project activity does not involve use of biomass.

implementing CDM A/R project activities"; or ii. Is included in the project boundary of one or several registered A/R CDM project activities; (c) Plantations established on peat lands are not eligible even if qualifying under condition (i) or (ii) above.	
In cases where the project activity utilizes charcoal produced from renewable biomass as fuel, the methodology is applicable provided that: (a) Charcoal is produced in kilns equipped with a methane recovery and destruction facility; or (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered.	Not Applicable: The project does not involve use of charcoal produced from renewable biomass.
In the case of project activities involving changes in raw materials (including additives), it shall be demonstrated that additive materials are abundant in the country/region, according to the following procedures: Step 1: using relevant literature and/or interviews with experts, a list of raw materials to be utilized is prepared based on the historic and/or present consumption of such raw materials. Step 2: the current supply situation for each type of raw material to be utilized is assessed and their surplus availability is demonstrated using one of the approaches below: • Approach 1: demonstrate that the raw materials to be utilized, in the region of the project activity, are not fully utilized. For this purpose, demonstrate that the quantity of material is at least 25% greater than the demand for such materials or the availability of alternative materials for at least one year prior to the project implementation; • Approach 2: demonstrate that suppliers of the raw materials to be utilized, in the	Applicable and fulfilled: As per clarification number SSC_518, surplus availability is not required to be demonstrated for raw materials which are industrial products having commercial value. However, surplus availability of waste materials used as raw material in the project activity should be demonstrated. For the VCS project activity, only fly ash is a waste product and surplus availability of fly ash has been demonstrated in line with Approach 1 provided by the methodology. As per annual report of Central Electricity Authority, Government of India[3], the utilisation of fly ash was 57%, resulting in a surplus availability of 43%.

[3] *Page 82 of the report available at: http://www.cea.nic.in/reports/yearly/annual_rep/2009-10/ar_09_10.pdf*

region of the project activity, are not able to sell all of their supply of these materials. For this purpose, project participants shall demonstrate that a representative sample of suppliers of the raw materials to be utilized, in the region, had a surplus of materials (e.g. at the end of the period during which the raw material is sold) that they could not sell and that is not utilized.	
This methodology is applicable under the following conditions: (a) The service level of project brick shall be comparable to or better than the baseline brick, i.e. the bricks produced in the brick production facility during the crediting period shall meet or exceed the performance level of the baseline bricks (in terms of, for example dry compressive strength, wet compressive strength, density). An appropriate national standard shall be used to identify the strength class of the bricks; bricks that have compressive strengths lower than the lowest class bricks in the standard are not eligible under this methodology. Project bricks are tested in nationally approved laboratories at six-month intervals (at a minimum) and test certificates on compressive strength are made available for verification; (b) The existing facilities involving modification and/or replacement shall not influence the production capacity beyond ±10% of the baseline capacity unless it is demonstrated that the baseline for the added capacity is the same as that for the existing capacity in accordance with paragraph 4 above; (c) Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO2 equivalent annually.	<u>Applicable and fulfilled:</u> The applicability conditions are being fulfilled in the following manner: a) The compressive strength of the project activity AAC blocks is comparable to the baseline clay bricks. As per Indian Standard on common burnt clay building bricks – specifications (IS 1077:1992) published by Bureau of Indian Standards, Government of India, the compressive strength of the lowest class of clay bricks is 3.5 N/mm^2, while the compressive strength of AAC blocks as taken from laboratory test certificate of MIL is 3.75 N/mm^2, which is more than the compressive strength of lowest class of baseline bricks. Compressive strength of the project AAC blocks would be monitored on a semi annual basis by conducting tests in nationally approved laboratory, throughout the crediting period. b) The facility is not an existing facility. c) Maximum annual emission reductions from the project activity are estimated to be around 39,949 tCO_2e/year, which is less than the methodology limit of 60,000 tCO_2e
This methodology is not applicable if local regulations require the use of the proposed technologies or raw materials for the manufacturing of bricks unless widespread non compliance (i.e. less than 50% of brick production activities in the country comply) of	<u>Not Applicable:</u> There is no local regulation by any government authority that regulates the brick manufacturers to install any specific

the local regulation evidenced.	technology of brick manufacturing. There is a local regulation on use of fly ash (one of the raw material for project blocks) for the manufacturing of bricks. As per MOEF Notification dated 14th September 1999 and its amendments dated 27th August 2003 and 3rd November 2009, use of 50% fly ash in brick manufacturing units set up within 100 km of a coal or lignite based thermal power plant is mandatory. As per data taken from "Graph I" on page 82 of the Central Electricity Authority Annual Report 2009 - 10[4], of the 57.11[5]% utilization of fly ash generated annually, that consumed in bricks manufacturing is a meager 9%. The absence of compliance of the aforesaid notification has been mentioned in the report [6] submitted jointly by Akanksha Tiwari and Anubhav Sogani to the regional MoEF office of the Western Region of India. Reasons behind the non-compliance vary from inappropriate quality of the fly ash available, to high transportation costs and lack of adequate technological and financial support from the regulatory or funding institutions, as have been reported in the experimental study[7] by B.V.M Engineering College, Gujarat, and presented in the "National Conference on Recent Trends in Engineering and Technology". In the state of Gujarat itself, incompatibility of the soil in mixing with the fly ash was cited as one of the major reasons by the brick manufacturers contending [8] the notification. The increase in cost of fly ash bricks production, compared to the Business As Usual practice of manufacturing clay bricks, resulting from the above factors deter the brick manufacturers from utilizing fly ash, thus leading to low compliance of the aforesaid notification, as has

[4] *http://cea.nic.in/reports/yearly/annual_rep/2009-10/ar_09_10.pdf*
[5] *Page 82 of the report: http://moef.nic.in/downloads/public-information/MoEF-IIFM-thermal-power-plants.pdf*
[6] *Page 82 of the Report: http://moef.nic.in/downloads/public-information/MoEF-IIFM-thermal-power-plants.pdf*
[7] *Section on limitations regarding utilization of fly ash as provided in the report available at: http://webcache.googleusercontent.com/search?q=cache:http://www.bvmengineering.ac.in/docs/published%2520papers/civilstruct/civil/101004.pdf*
[8] *Paragraph 4 of the news article available at: http://www.business-standard.com/india/news/brick-makers-seek-exemptiongreen-guidelines/188758/*

	been mentioned in "Utilization of Fly-ash by Brick Manufacturers - Environmental Costs vs. Benefits", a report[9] sponsored by the MoEF (GoI). These facts have been further corroborated through studies published in the Indian Concrete Journal[10] and independent publications[11] by INSWAREB (Institute for Solid Waste Research& Ecological Balance – an NGO that has made significant contribution to the utilisation fly ash in India) in response to the above notification. Hence, it can be concluded from the above discussion that: i. There is no regulation that mandates the use of any specific technology for brick manufacturing ii. There is widespread non-compliance of the regulation to use 50% of fly-ash for brick manufacturing within 100 kms of a thermal power plant Hence the applicability condition is not relevant for the project activity. However it should be noted that MIL's plant is located within 100 km radius of a coal based thermal power plant and is using more than 50% fly ash, complying with the notification.

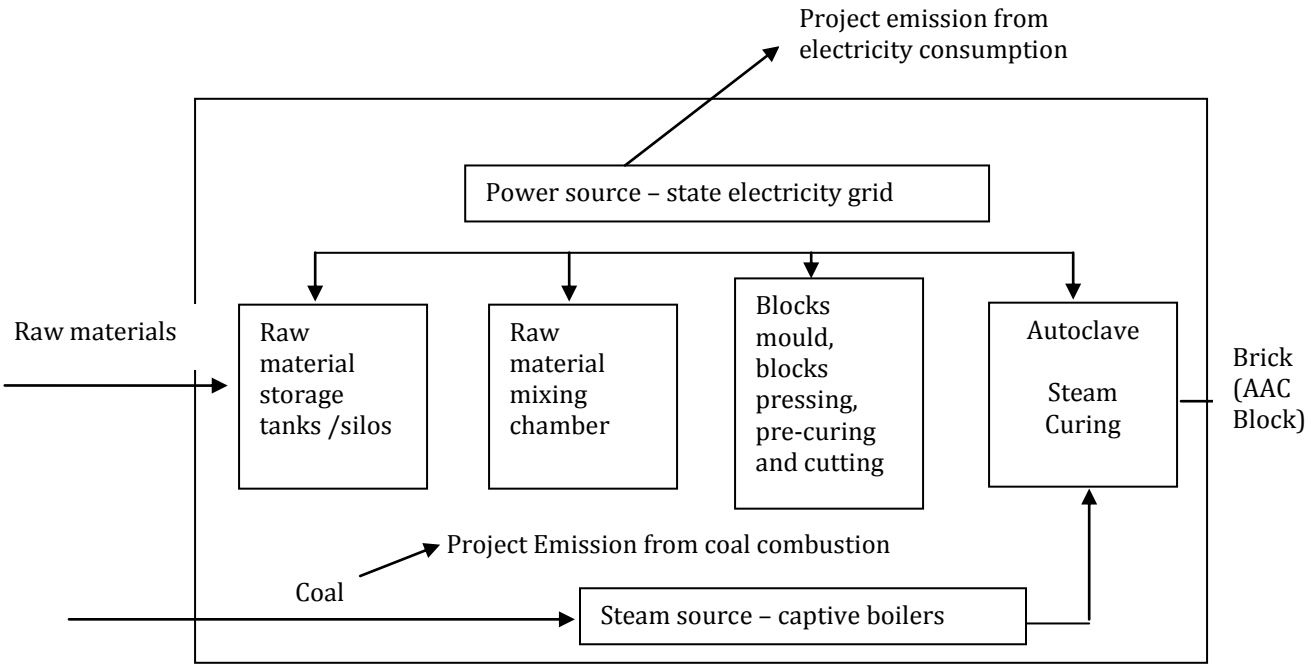
Thus, the project activity fulfils the applicability criteria of **AMS-III.Z, version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture)**, and accordingly the application of the methodology is justified.

2.3 Project Boundary

Project boundary has been delineated in line with paragraph 13 of the methodology **AMS-III.Z, version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture)**. "The project boundary is the physical, geographical site where the brick production takes place during both the baseline and crediting periods."

[9] *Paragraph four of the study available at: http://www.mse.ac.in/completed/proj-flyash.htm*
[10] *Conclusion section in page 21 and point of view section in the report available at: http://www.icjonline.com/forum/point_of_view.pdf*
[11] *Pages 2, 3, 5 and 7 of the report available at: http://www.fal-g.com/nattach/files/SuggestionstoDNonFAdt._6-11-08.pdf*

The boundary has been drawn below:



Source		Gas	Included?	Justification/Explanation
Baseline	Fossil fuel combustion in red clay brick kiln	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
		Other	No	Neglected for simplicity
Project	Coal combustion in autoclave boiler	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
		Other	No	Neglected for simplicity
	Electricity consumption for operating plant machinery	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
		Other	No	Neglected for simplicity
Leakage	GHG emissions during raw material production	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
		Other	No	Neglected for simplicity

Source		Gas	Included?	Justification/Explanation
	GHG emissions during raw material transportation	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simplicity
		N_2O	No	Neglected for simplicity
		Other	No	Neglected for simplicity

2.4 Baseline Scenario

As per paragraph 14 of the methodology **AMS-III.Z, version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture)**,

*"*The baseline emissions are the fossil fuel consumption related emissions (fossil fuel consumed multiplied by an emissions factor) associated with the system(s), which were or would have otherwise been used, in the brick production facility (ies) in the absence of the project activity.

(a) For projects that involve replacing, modifying or retrofitting systems in existing facilities, the average of the immediately prior three-year historical fossil fuel consumption data, for the existing facility, shall be used to determine an average annual baseline fossil fuel consumption value. Similarly, prior three-year historical production data (excluding abnormal years) for the existing facility, shall be used to determine an average annual historical baseline brick production rate in units of weight or volume. For calculating the emission factor for fossil fuel, reliable local or national data shall be used. IPCC default values shall be used only when country or project specific data are not available or demonstrably difficult to obtain;

(b) For projects involving the installation of systems in a new facility or a capacity addition in an existing system, the average annual baseline fossil fuel consumption value and the baseline brick production rate shall be determined as that which would have been consumed and produced, respectively, under an appropriatebaseline scenario. If the baseline scenario identification as per paragraph 4 above results in more than one alternative technologies with different levels of energy consumption, the alternative with the least emissions intensity should be chosen for determining the baseline emissions of the facility."

The project activity is implemented at a new facility, i.e. it is a Greenfield project activity. As per the methodology **AMS-III.Z Version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture)**, for new project activities, the project activity should be in compliance with the general guidelines to SSC CDM methodologies. Accordingly, the baseline to the project activity has been determined in line with the general guidelines. As per paragraph 12 of the General Guidelines to SSC CDM methodologies, Version 19, the baseline for Type II and Type III project activity types are established as follows:

"Type II and III Greenfield projects (new facilities) may use a Type II and Type III small scale methodology provided that they can demonstrate that the most plausible baseline scenario for this project activity is the baseline provided in the respective Type II and Type III small-scale methodology. The demonstration must include an assessment of the alternatives of the project activity using the following steps:

Step 1:
Identify the various alternatives available to the project proponent that deliver comparable level of service including the proposed project activity undertaken without being registered as a CDM project activity.

Step 2:
List the alternatives identified in Step 1 that are in compliance with the local regulations. If any of the identified baselines is not in compliance with the local regulations, then exclude the same from further consideration.

Step 3:
Eliminate and rank the alternatives identified in Step 2 taking into account barrier tests specified in "Guidelines on the demonstration of additionality of small-scale project activities".

Step 4:
If only one alternative remains that is:
(a) Not the proposed project activity undertaken without being registered as a CDM project activity; and
(b) Corresponds to one of the baseline scenarios provided in the methodology; then the project activity is eligible under the methodology. If more than one alternative remain that correspond to the baseline scenarios provided in the methodology, choose the alternative with the lowest emissions as the baseline."

Step 1 of the Guidelines

The alternative scenarios to the project activity comprises of different walling materials that are available in India. Based on the different walling materials, the alternatives available to MIL which would have comparable levels of output are as follows:

Table B.4.1

Baseline alternative scenario	**Alternative Walling Materials**	**Alternative description**
A	AAC Blocks	The project activity undertaken without being registered as a VCS project activity, i.e., installation of a 300,000 m^3/annum AAC blocks manufacturing unit. The AAC blocks produced would conform to relevant national standard.
B	Baked Clay Bricks	The prevailing alternative technology in the bricks sector, that deliver outputs or services (e.g. electricity, heat or cement) with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology. Prevailing alternative for walling material manufacturing in India is baked (fired) clay brick manufacturing through the application of various technologies[12] (as VSBK, Fixed Chimney BTK, Moveable Chimney BTK, Tunnel Kiln, Clamp and other Batch Kilns, etc.) and fuels[13]). These bricks have comparable properties with those of the AAC blocks, in terms of quality and application areas. The estimated production of

[12] *Page 27 of the report: Strategies for Cleaner Walling Material in India; http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*
[13] *Page 26 of the report: Strategies for Cleaner Walling Material in India; http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*

		burnt clay bricks is to the tune of 140 billion out of total 151.83 billion brick equivalent[14]. **Hence this is evidently the most prevailing alternative to the project activity.**
C	Fly ash bricks	Manufacturing of fly-ash bricks having comparable quality and application area as AAC block. There is a local regulation on use of fly ash (one of the raw material for project blocks) for the manufacturing of bricks. As per MOEF Notification dated 14th September 1999 and its amendments dated 27th August 2003 and 3rd November 2009, use of 50% fly ash in brick manufacturing units set up within 100 km of a coal or lignite based thermal power plant is mandatory. As per data taken from "Graph I" on page 82 of the Central Electricity Authority Annual Report 2009 - 10[15], of the 57.11[16]% utilization of fly ash generated annually, that consumed in bricks manufacturing is a meager 9%. The absence of compliance of the aforesaid notification has been mentioned in the report[17] submitted jointly by Akanksha Tiwari and Anubhav Sogani to the regional MoEF office of the Western Region of India. Reasons behind the non-compliance vary from inappropriate quality of the fly ash available, to high transportation costs and lack of adequate technological and financial support from the regulatory or funding institutions, as have been reported in the experimental study[18] by B.V.M Engineering College, Gujarat, and presented in the "National Conference on Recent Trends in Engineering and Technology". In the state of Gujarat itself, incompatibility of the soil in mixing with the fly ash was cited as one of the major reasons by the brick manufacturers contending[19] the notification. The increase in cost of fly ash bricks production, compared to the BAU practice of manufacturing clay bricks, resulting from the above factors deter the brick manufacturers from utilizing fly ash, thus leading to low compliance of the aforesaid notification, as has been mentioned in "Utilization of Fly-ash by Brick Manufacturers - Environmental Costs vs. Benefits", a report[20] sponsored by the MoEF (GoI). These facts have been further corroborated through studies published in the Indian Concrete Journal[21] and independent publications[22] by INSWAREB (Institute for Solid Waste Research& Ecological Balance – an NGO that has made significant contribution to the utilisation fly ash in India) in response to the above notification.

[14] *Strategies for Cleaner Walling Material in India, footnote 3 in page 1 of the document; http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*
[15] *http://cea.nic.in/reports/yearly/annual_rep/2009-10/ar_09_10.pdf*
[16] *Page 82 of the report: http://moef.nic.in/downloads/public-information/MoEF-IIFM-thermal-power-plants.pdf*
[17] *Page 82 of the Report: http://moef.nic.in/downloads/public-information/MoEF-IIFM-thermal-power-plants.pdf*
[18] *Section on limitations regarding utilization of fly ash as provided in the report available at: http://webcache.googleusercontent.com/search?q=cache:http://www.bvmengineering.ac.in/docs/published%2520papers/civilstruct/civil/101004.pdf*
[19] *Paragraph 4 of the news article available at: http://www.business-standard.com/india/news/brick-makers-seek-exemptiongreen-guidelines/188758/*
[20] *Paragraph four of the study available at: http://www.mse.ac.in/completed/proj-flyash.htm*
[21] *Conclusion section in page 21 and point of view section in the report available at: http://www.icjonline.com/forum/point_of_view.pdf*
[22] *Pages 2, 3, 5 and 7 of the report available at: http://www.fal-g.com/nattach/files/SuggestionstoDNonFAdt._6-11-08.pdf*

		Hence, it can be concluded from the above discussion that there is widespread non-compliance of the regulation to use 50% of fly-ash for brick manufacturing within 100 kms of a thermal power plant. Hence fly-ash bricks cannot be considered as an alternative to the project activity.
D	Cement stabilized soil blocks	Manufacturing of cement stabilized soil block having comparable quality and application area as AAC block. However the penetration of this technology is to the tune of only 0.1%[23]. Hence this cannot be construed as the prevailing alternative to the project activity.
E	Concrete Blocks	Manufacturing of concrete blocks having comparable quality and application area as AAC block. The estimated production of concrete blocks is to the tune of 9 billion out of total 151.83 billion brick equivalent which corresponds to 5.9% of total walling materials.[24]. Hence the production of concrete blocks as an alternate walling material cannot be construed as the prevailing alternative to the project activity.
F	FAL-G bricks	Manufacturing of FAL-G bricks having comparable quality and application area as AAC block. The estimated production of FAL-G bricks is to the tune of 2.4 billion out of total 151.83 billion brick equivalent which corresponds to only 1.6% of total walling materials.[25]. Hence the production of FAL-G bricks as an alternate walling material cannot be construed as the prevailing alternative to the project activity

Step 2 of the Guidelines
All the baseline alternatives identified under step 1 above, are in compliance with local laws and regulations.

Step 3 of the guidelines: Referring to "Guidelines on the demonstration of additionality of small-scale project activities", version 09:

"Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) ***Investment barrier****: a financially more viable alternative to the project activity would have led to higher emissions*
(b) ***Technological barrier:*** *a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions*
(c) ***Barrier due to prevailing practice****: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions*
(d) ***Other barriers:*** *without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher."*

[23] *Strategies for Cleaner Walling Material in India, http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*
[24] *Strategies for Cleaner Walling Material in India, http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*
[25] *Strategies for Cleaner Walling Material in India, http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf*

The project proponent has used the "barrier due to prevailing practice" and "other barriers" to determine the most plausible baseline for the project activity.

As demonstrated in Step 1 above, since burnt clay bricks are the prevailing walling material that is widely used in India and since the market share of other bricks/blocks manufacturing technology is negligible as compared to the burnt clay bricks, options C, D, E, & F have not been taken forward for further analysis. Hence only alternative A and alternative B have been carried forward for further analysis.

The barrier analysis for identified scenarios is carried out as follows:

Table B.4.3

Barrier	**Scenario A – Manufacture of fly ash based AAC blocks without VCS benefit in consideration**	**Scenario B – Baked clay brick manufacturing**
Barrier due to prevailing practice	Faces "Barrier due to prevailing practice • Fly ash based AAC block is not the prevailing walling material used or manufactured in India. As per, "Strategies for cleaner walling material in India" [26], AAC blocks have low penetration in India which is to the tune of only 0.2% and fired clay bricks are currently prevalent in Indian walling industry and the scenario is expected to be same in future. AAC block project activity technology, unlike the traditional clay brick making, requires recipe control of several main ingredients namely fly ash, cement, lime and water etc. at the mixing step. In case there are changes to the sources of the raw materials, the chemistry and hence the recipe needs to be reworked. Hence it requires the intervention of advanced technologies leading to much higher investments. AAC blocks being a relatively newer product as compared to baked clay bricks in India, there is high scarcity of skilled operators for successfully running the AAC block manufacturing unit. For operating the unit, special on the job training needs to be provided to	Does not face Barrier due to prevailing practice – Baked clay bricks manufacturing is an age old and widely followed process for construction brick manufacturing in India. The brick manufacturing industry in India is predominantly constituted of conventional clay bricks manufacturing units. There are several small capacity kilns and few large capacity kilns in India. As per Status Report on VSBKs in India[27], there are more than 100,000 fired clay brick kilns in India, manufacturing more than 140 billion bricks per year. This is further corroborated through recent data published in "Strategies for cleaner walling material in India" [28] which estimates that out of 151.83 billion brick equivalent, burnt clay bricks contribute 140 billion brick equivalent. Hence there is an overwhelming prevalence of burnt clay bricks in walling materials used in India. As a result, there is much easier availability of skilled operators for successfully running a clay bricks manufacturing unit. Raw material is clay which is available to the brick manufacturer from his surroundings.

[26] http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf *Page #10)*
[27] http://www.cosmile.org/papers/brick_statuspaperVSBKsindia2003.pdf *(page #2)*
[28] http://shaktifoundation.in/wp-content/uploads/2014/02/strategies%20for%20cleaner%20walling%20materials%20in%20india.pdf *(Page #10)*

	operators. On the contrary, clay brick production is a simple commonly used technological practice and is practiced at the cottage industry level. Small fired-clay brick producers have no incentives to introduce alternate technologies, which require new investments, training to stabilize the operation, and a different business practice in long-term perspective. Burnt clay bricks are therefore the most prevalent walling material used and manufactured in India and is also expected to remain the most prevalent walling material in the future unless significant regulatory mechanisms are evolved and enforced. • Further, the price of AAC blocks has to be kept lower than burnt clay bricks due to the reasons of market resistance to fly ash containing AAC blocks, as mentioned below.	Manufacturing of burnt clay bricks does not require very sophisticated technology and the technique used is proven and widely practiced for many decades. Burnt clay bricks continue to be the most popular form of walling material, accounting for most of the total market in the country. This is supported by studies done by organizations like TERI[29].
Other Barriers – Market Acceptability barrier	• Building construction using AAC blocks is not a common practice in India. According to a study conducted by IMRB International[30], given the wall area addition in India in 2007 - 08, the share of AAC blocks is low at less than 1%. This fact is evidence of the extremely low market acceptance of the product, and poses additional risk to MIL, in terms of reduced demand and corresponding under utilization of the plant. It may also be noted that the plant has been operating at a lower capacity due to lower demand of the AAC block • The tIMRB report as referred above, also presents viewpoints of builders and consultants in construction industry, wherein the choice of AAC block as construction material is found to be negligible compared to clay bricks. The negative perception about the durability and quality of AAC blocks arises from low consumer awareness about the product. In	<u>Does not face this barrier</u> The consumer in India is preferentially biased towards clay bricks. A clay bricks manufacturer does not require any additional marketing efforts for selling the complete production output.

[29] http://www.cosmile.org/papers/brick_statuspaperVSBKsindia2003.pdf
[30] *IMRB International is an independent agency*

	addition to the grey color of AAC blocks imparted by the color of fly ash, the mere presence of ash in the product also creates negative perception, affecting the sales of product in the market.	

Step 4 of the Guidelines

From the above barrier analysis, it can be concluded that alternative B is the only alternative which is not prevented by any barrier. Thus, there is only one alternative remaining, which is not the project activity undertaken without VCS benefits in consideration. Thus, the most plausible alternative (Alternative B) derived from the above analysis is considered as baseline to the VCS project activity.

Thus, the baseline to the project activity is:

Manufacturing of fired-clay bricks through conventional fired clay brick production processes

The identified baseline scenario, as mentioned earlier, includes different technologies with different levels of energy consumption. Hence, a weighted average energy use of these technologies has been considered for determining the baseline emissions of the facility or facilities.

2.5 Additionality

The additionality of the project activity has been demonstrated in line with Guidelines on the demonstration of additionality of small-scale project activities, version 09.

As per the guidelines:

Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

a) Investment barrier
b) Technological barrier
c) Barrier due to prevailing practice
d) Other barriers

The project proponent has used the “barrier due to prevailing practice” and “other barriers (market acceptability barrier)” to determine the most plausible baseline for the project activity.

Detailed analysis of the barriers being faced by the project activity has been undertaken as part of baseline determination under section 2.4 of the PD. The barriers being faced by the project activity introduces several risks to the project, which are expected to be mitigated through the additional revenue from sale of verified emission reductions (VERs) generated by the VCS project activity.
Thus, in view of the above discussion, it can be concluded that the project activity is additional.

Analysis of local and national policies w.r.t the project activity:

There is no regulation in the state of Gujarat r from the Central Government of India, which mandates the installation of an AAC blocks manufacturing plant, nor is there any mandate that prevents the manufacturing of bricks through conventional processes.

Thus, the project activity is not mandated by any state or national agency of India.

2.6 Methodology Deviations

There are no methodology deviations in the project activity.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

As per Section B.4 of the VCS PD the baseline to the project activity is – Installation of similar capacity baked clay bricks manufacturing unit. The corresponding energy baseline has been calculated taking into account the different technologies with different levels of energy consumption associated with the baked clay brick production.

Baseline emissions are quantified in line with paragraph 15 of the methodology as follows:

$$BE_y = EF_{BL} * P_{PJ,y}$$ Equation no. 1

Where:

BE_y	tCO_2e	The annual baseline emissions from fossil fuels displaced by the project activity in the year y
EF_{BL}	tCO_2/m^3	The annual production specific baseline emission factor
$P_{PJ,y}$	m^3	The annual net production of the facility in year y

Since the project is being implemented at a Greenfield location, paragraph 17 of the methodology **AMS-III.Z Version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture)** shall be used to determine baseline emission factor. The project activity uses paragraph 17 (c) to determine the baseline emission factor.

"Annual production specific emission factor (EF_{BL}) for installation of systems in a new facility or for capacity addition in an existing system shall be determined using reference plant approach."

Using the reference plants approach, as detailed in paragraph 17 of the methodology **AMS-III.Z Version 04 (Fuel Switch, process improvement and energy efficiency in brick manufacture). version 04**, the baseline emission factor shall be calculated from emissions data of other brick manufacturing plant of capacity 300.000 m^3/yr and using the common practice technology. As established in section 2.4 of the PD, the common practice technology in this sector is red clay fired clay bricks, across all plant capacities in India. Publicly available documents[31] released by independent party provides weighted average emission factor for brick manufacturing sector in India. The document calculates the average emission factor for the different technologies and fuel types (represented by $EF_{CO2,\ brick}$ in the Equation below)

For this project activity, the lower range of the emission factor of 780 $kgCO_2$/1000 for baseline bricks has been directly sourced from the document and used. The public document from which it is extracted provides emission factor in terms of CO_2/1000 baseline bricks, however the size and density of AAC blocks produced in the project plant is different from that of baseline bricks. So,

[31] *Asian Institute of Technology Report Page 25 available at:* http://www.faculty.ait.ac.th/visu/Prof%20Visu's%20CV/Books%20and%20research%20reports/BRICK%20AND%20CERAMIC.pdf

the emission factor of 780 $kgCO_2$/1000 baseline bricks has been converted into a volumetric emission factor as follows:

The annual production specific baseline emission factor is thus estimated *ex-ante* as follows:

$$EF_{BL} = (EF_{CO2,brick} / W_{brick}) * (D_{brick} / 1000)$$

Where:

EF_{BL}	tCO_2/m^3	The annual production specific emission factor for year y
$EF_{CO2,brick}$	$kgCO_2$/brick	CO_2 emission per baseline brick produced (as obtained from third party documents)
W_{brick}	kg	Weight of each baseline brick produced
D_{brick}	kg/m^3	Density of each baseline brick produced

3.2 Project Emissions

Project emissions have been calculated using paragraph 20 of the methodology **AMS-III.Z Fuel Switch, process improvement and energy efficiency in brick manufacture (Version 04)**. Project emission sources relevant for this project are:

- Project emissions from electricity consumption within the project boundary
- Project emissions from coal consumption in the autoclave boiler for steam generation

Thus, the project emission can be represented using the following equation:

$$PE_y = PE_{elec,y} + PE_{fossilfuel,y}$$ Equation no. 6

Where:

PE_y	tCO_2	Project emission during the year y
$PE_{elec,y}$	tCO_2	Project emissions due to electricity consumption in year y
$PE_{fossilfuel,y}$	tCO_2	Project emission due to fossil fuel consumption in the year y

Project emission from fossil fuel consumption:

Sources of fossil fuel consumption in the project activity include coal consumption in the autoclave boiler and diesel oil consumption in the diesel based generators (DGs). Diesel consumption in DG sets is not required to be monitored as project emission due to diesel consumption would be conservatively accounted for, by considering the default project emission factor of: 1.3 tCO_2/MWh;[32] for all sources of electricity supplied – both from grid and DG set.

Thus, fossil fuel consumption in the project activity boiler is the only source of project emissions from fossil fuel consumption that has been accounted using the ***"Tool to calculate project or leakage CO_2 emission from fossil fuel combustion[33]"***.

[32] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf *(This default project emission factor of 1.3tCO2/MWh has been sourced from the document "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01, EB 39, Annex 7, Page 1)*

[33] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf *(Version 02, EB 41, Annex 11, Date: 02-August-2008)*

Referring to, "***Tool to calculate project or leakage CO_2 emission from fossil fuel combustion, version no. 2",*** the project emission from furnace oil and/or natural gas combustion in boilers has been calculated as follows:

As per the tool, CO_2 emission from fossil fuel combustion are calculated based on quantity of fuels combusted and the CO_2 emission co-efficient of these fuels.

The applicable equation is:

$$PE_{FC,y} = \sum_i FC_{i,y} * COEF_{i,y}$$ Equation no. 7

Where:

$PE_{FF,y}$	tCO_2	Project emission due to fossil fuel consumption in the year y
$FC_{i,y}$	kt	Quantity of fossil fuel type i combusted by the project activity equipment during the year y
$COEF_{i,y}$	tCO_2/kt	CO_2 emission coefficient of fuel type i in the year y

As per the tool, the CO_2 emission coefficient can be calculated using one of the options, depending on the availability of data.

- Option A: Based on the chemical composition of the fossil fuel type i
- Option B: Based on the net calorific value and the CO_2 emission factor of the fuel type i.

Option A should be the preferred approach, if the necessary data is available.

In absence of available data to implement option A, option B has been used to calculate the CO_2 emission co-efficient as follows:

$$COEF_{i,y} = NCV_{i,y} * EF_{i,y}$$ Equation no. 8

Where:

$COEF_{i,y}$	tCO_2/kt	CO_2 emission coefficient of fuel type i in the year y
$NCV_{i,y}$	TJ/kt	Weighted average net calorific value of the fuel type i in the year y
$EF_{i,y}$	tCO_2/TJ	Weighted average CO_2 emission factor of the fuel type i in the year y. The values have been fixed *ex-ante* as higher limit of the 95% uncertainty range as provided by IPCC 2006 Report.

Project emission from electricity consumption:

Referring to, "***Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 01***[34]", the project emission from electricity consumption has been calculated as follows:

As per the tool, the tool is applicable if one out of the following three scenarios applies to the sources of electricity consumption:

- Scenario A: Electricity consumption from the grid
- Scenario B: Electricity consumption from (an) off grid fossil fuel fired captive power plant
- Scenario C: Electricity consumption from the grid and fossil fuel fired captive power plant.

As discussed earlier, the project, would consume electricity from the state electricity grid and diesel generator sets. Under scenario C of the tool, case C III would be applicable as the implementation of the project activity may affect both the quantity of electricity that is generated in captive diesel generator sets

[34] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf *(Version 01, EB 39, Annex-7, date 16-May-2008)*

and quantity of electricity imported from grid. Electricity would be imported from the regional grid during the monitored period and the captive diesel generator set would operate intermittently during power failure of the grid or under emergency situations. As per the tool, for project activity which falls under case C III, the emission factor for electricity generated should be higher of the emission factors of electricity sources used (*i.e.* captive diesel generator set and the regional grid in this case). Emission factor for grid electricity is calculated using option A1 of the tool. The project plant is connected to the North East West North East (NEWNE) integrated grid of India and the combined margin emission factor of the NEWNE grid is 0.84 [35] tCO_2/MWh. Emission factor for captive diesel generator set is calculated using option B2 of the tool. The default emission factor of 1.3 tCO_2/MWh is used. The higher of the two emission factors is used for project emission calculation from electricity consumption. Thus, for project emission calculation from electricity consumption, the electricity supply source is being taken as the captive power plant, making scenario B applicable. Further, since scenario C III is applicable, the default transmission and distribution loss for project emission calculation of 20% has been used.

As per the baseline methodology procedure provided in the tool, project emissions from electricity consumption are calculated based on the quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses as follows:

$$PE_{elec,y} = \sum_{j} EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

Where:

$PE_{elec,y}$	tCO_2/yr	Project emissions due to electricity consumption in year y
$EC_{PJ,j,y}$	MWh/yr	Quantity of electricity consumed by the project emission source j in year y
$FE_{EL,j,y}$	tCO_2/MWh	Emission factor for electricity generation for source j in year y
$TDL_{j,y}$	%	Average technical transmission and distribution losses for providing electricity to source j in year y

Thus,

$$EF_{EL,j,y} = EF_{CPP,y}$$ Equation no. 10

Where:

$FE_{EL,j,y}$	tCO_2/MWh	Emission factor for electricity generation for source j in year y
$EF_{CPP,y}$	tCO_2/MWh	Emission factor for CPP in the year y

3.3 Leakage

Referring to paragraphs 18 and 19 of **AMS-III.Z Fuel Switch, process improvement and energy efficiency in brick manufacture (Version 04)**., sources of leakage emission relevant to the project activity are as follows:

Source of leakage emission as per AMS-III.Z Fuel Switch, process improvement and energy efficiency in brick manufacture (Version 04)	**Relevant/Not relevant to the project activity**
Leakage emissions on account of diversion of biomass from other uses (competing uses) shall be calculated as per "General guidance on	The boilers in the project activity are operated by combustion of coal.

[35] *Combined margin CO2 emission factor for North East West North East Electricity Grid system as per CEA database Version 09, available at www.cea.nic.in*

leakage in biomass project activities".	
In the case of project activities involving change in production process or a change in type or quantity of raw and/or additive materials as compared to the baseline, the incremental emissions associated with the production/consumption and transport of those raw and/or additive materials consumed as compared to baseline, shall be calculated as leakage**.**	The project activity involves use of fly-ash, cement, lime, gypsum and minor quantity of aluminium powder as raw materials. Whereas baked clay bricks (baseline) use clay from in and around project site. Thus the project leads to transportation of the various raw materials to the project site. Further, since cement, lime etc. is used in the production of AAC blocks; emissions due to production of the same should also be accounted. The following leakage sources have been accounted in the project activity: (i) transportation associated with the procurement of fly ash, cement, lime, gypsum, aluminium powder and (ii) manufacturing process of cement, lime gypsum and aluminium powder (fly ash is a waste product and does not result in additional emissions from fly ash production) While the transportation related emission will be computed mainly on the basis of monitored parameters, the production related emissions will be determined by monitoring the amount of raw materials being consumed and multiplying the monitored value by the default GHG emission factors (fixed *ex-ante*) for production of these raw materials.

The applicable equations are:

$$LE_y = LE_{rm,prod,y} + LE_{rm,trans,y}$$ Equation no. 3

Where:

LE_y	tCO_2	Leakage emission from raw material production and transportation in the year y
$LE_{rm,prod,y}$	tCO_2	Leakage emission from raw material production in the year y
$LE_{rm,trans,y}$	tCO_2	Leakage emission from raw material transportation in the year y

Leakage emissions due to raw material production:

$$LE_{rm,prod,y} = RMC_{cement,y} * COEF_{cement} + RMC_{lime,y} * COEF_{lime} + RMC_{gypsum,y} * COEF_{gypsum} + RMC_{aluminium,y} * COEF_{aluminium}$$

Equation no. 4

Where:

$LE_{rm,prod,y}$	tCO_2	Leakage emission from raw material production in the year y
$RMC_{cement,y}$	kt	Quantity of cement consumed for producing AAC blocks in the year y
$COEF_{cement}$	tCO_2/kt	CO_2 emission factor of cement production
$RMC_{lime,y}$	kt	Quantity of lime consumed for producing AAC blocks in the year y
$COEF_{lime}$	tCO_2/kt	CO_2 emission factor of lime production
$RMC_{gypsum,y}$	kt	Quantity of gypsum consumed for producing AAC blocks in the

		year y
$COEF_{gypsum}$	tCO_2/kt	CO_2 emission factor of gypsum production
$RMC_{aluminium,y}$	kt	Quantity of aluminium powder consumed for producing AAC blocks in the year y
$COEF_{aluminium}$	tCO_2/kt	CO_2 emission factor of aluminium production

Leakage emission due to raw material transportation:

Leakage emission from raw material transportation has been calculated in line with the guidelines provided in ***the Tool to calculate "project and leakage emissions from road transportation of freight" version 01.1.0***[36].

Vehicle class used for transportation will be monitored for *ex-post* calculation of leakage emissions and for *ex-ante* estimation of leakage emissions, light vehicles with GVM of less than or equal to 26 tonnes has been used.

Option B, the conservative default value has been used to calculate leakage emission from raw material transportation. The following information, as required by the tool, has been documented:

Requirement of the tool	**Project specific scenario**
The origin and destination of the freight (to the extent that this is known at validation);	The origin and the destination of freight transportation for different raw materials are as follows: Cement: Will be transported from Magdalla, Gujarat to the project site (approximate roundtrip distance: 300 km) Fly ash: Will be transported from Dahanu, Maharashtra to the project site (approximate roundtrip distance: 140 km) Lime: will be transported from Jodhpur, Rajasthan to the project site (approximate roundtrip distance: 1700 km) Gypsum: will be transported from Ankleshwar, Gujarat to the project site (approximate roundtrip distance: 380 km) Aluminium powder: Will be transported from Nagpur, Maharashtra to the project site (approximate roundtrip distance: 1700 km) For *ex-ante* estimation, the origins have been taken from actual purchase invoices. For *ex-post* calculation, the distance travelled will be calculated

[36] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf *(EB, 70, Annex 23, date 23-November-2012. The amendment expands the applicability to freight transport by rail and provides default values to calculate project or leakage emissions from rail transportation of cargo as well as changes the title from "Project and leakage emissions from road transportation of freight" to Project and leakage emissions from transportation of freight".)*

	based on the monitored origin and destination.
The type(s) of freight that are planned to be transported;	The following raw materials will be transported for the project: • Cement • Fly ash • Lime • Gypsum • Aluminium powder
The planned number of trips made and/or the planned quantity of freight that should be transported; and	The quantity of freight transported will be monitored *ex-post*. For *ex-ante* estimation the calculated consumption quantity of raw material consumption, has been taken as the quantity of freight transported.
The option selected (A or B) to determine emissions.	Option B i.e. the conservative default value of baseline emission factor will be used for emission calculation throughout the fixed crediting period of 10 years.

$$LE_{rm,trans,y} = \sum_{f} D_{f,y} * FR_{f,y} * EF_{CO2,f} * 10^{-6} \quad \text{Equation no. 5}$$

Where:

$LE_{rm,trans,y}$	tCO_2	Leakage emission from road transportation of freight in monitoring period m
$D_{f,y}$	km	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
$FR_{f,m}$	tonne	Total mass of freight transported in freight transportation activity f in monitoring period m
$EF_{CO2,f}$	gCO_2/t-km	Default CO_2 emission factor for freight transportation activity f
f		Freight transportation activities conducted in the project activity in monitoring period m

3.4 Net GHG Emission Reductions and Removals

Years	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2012 – 13	61,742	21,554	239	39,949
2013 – 14	61,742	21,554	239	39,949
2014 - 15	61,742	21,554	239	39,949
2015 – 16	61,742	21,554	239	39,949
2016 – 17	61,742	21,554	239	39,949

2017 – 18	61,742	21,554	239	39,949
2018 – 19	61,742	21,554	239	39,949
2019 – 20	61,742	21,554	239	39,949
2020 – 21	61,742	21,554	239	39,949
2021 – 22	61,742	21,554	239	39,949
Total	617,420	215,540	2,390	399,490

It is hereby confirmed that there has not been any double counting between the time periods as mentioned in the table above.

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	**EF_{BL}**
Data unit	tCO_2/m^3
Description	The annual production specific baseline emission factor
Source of data	Calculated based on data taken from: 1. "Brick and ceramic sectors" report by Asian Institute of Technology[37] 2. "Energy Conservation and Pollution Control in brick kilns" report by Sameer Maithel, N Vasudevan, Lt. Col. Rakesh Joshi (Retrd.)[38] 3. Density of bricks taken from www.reade.com[39]
Value applied:	0.3993
Justification of choice of data or description of measurement methods and procedures applied	The value is a calculated value. It has been derived based on CO_2 emission per brick data taken from "Brick and ceramic sector report", which has been converted to CO_2 emission per unit volume of baseline brick with weight of each brick taken from "Energy conservation and Pollution Control in brick kilns" report and density of each brick from the engineering tool box. Values used are such that conservativeness of baseline emission factor is ensured.
Purpose of Data	This value has been used to baseline emissions
Comments	-

Data / Parameter	**$COEF_{cement}$**
Data unit	tCO_2/kt
Description	CO_2 emission factor of cement production

[37] http://www.faculty.ait.ac.th/visu/Prof%20Visu's%20CV/Books%20and%20research%20reports/BRICK%20AND%20CERAMIC.pdf
[38] http://www.cosmile.org/papers/brick_statuspaperVSBKsindia2003.pdf
[39] http://www.reade.com/Particle_Briefings/spec_gra2.html

Source of data	Cement Sustainability Initiative (CSI)- The Cement CO_2 and Energy Protocol . [40] CO_2 and Energy Accounting and Reporting Standard for the Cement Industry(May 2011) by WBCSD- Version 3.0
Value applied:	$0.638x10^3$
Justification of choice of data or description of measurement methods and procedures applied	This value is a default value as per Cement Sustainability Initiative protocol and is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	-

Data / Parameter	**$COEF_{aluminium}$**
Data unit	tCO_2/kt
Description	CO_2 emission factor of aluminium production
Source of data	IPCC 2006 Report Volume 3 Chapter 1 for Soderberg Smelting Technology
Value applied:	1.7×10^3
Justification of choice of data or description of measurement methods and procedures applied	IPCC Report is an authentic source of data. Further, for leakage emission more emission intensive of the two available technologies (Prebake and Soderberg) for aluminium production is taken for conservativeness.
Purpose of Data	Leakage emissions calculation
Comments	-

Data / Parameter	**$COEF_{lime}$**
Data unit	tCO_2/kt
Description	CO_2 emission factor of lime production
Source of data	IPCC Guidelines 2006 for NGGI (Vol 3 Ch 2 Eqn 2.8)
Value applied:	$0.75x10^3$
Justification of choice of data or description of measurement methods and procedures applied	IPCC 2006 data is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	-

[40] http://www.wbcsdcement.org/pdf/tf1_co2%20protocol%20v3.pdf

Data / Parameter	**$COEF_{gypsum}$**
Data unit	-tCO2/t
Description	CO_2 emission factor of gypsum production
Source of data	Methodology for free allocation of emission allowances in the EU ETS post 2012[41]
Value applied:	[42]0.01
Justification of choice of data or description of measurement methods and procedures applied	EU ETS data is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	-

Data / Parameter	**$EF_{CO2,f}$**
Data unit	gCO_2/t-km
Description	Default CO_2 emission factor for freight transportation activity f
Source of data	Default value as provided in the methodological tool to calculate "*Project and leakage emissions from road transportation of freight*" version 01.1.0 [43]
Value applied:	Light vehicles – 245 Heavy vehicles – 129
Justification of choice of data or description of measurement methods and procedures applied	This is a default data as provided by UNFCCC and is an authentic source of data
Purpose of Data	Leakage emissions calculation
Comments	The values are default values as provided by UNFCCC tool.

Data / Parameter	**D_{brick}**
Data unit	kg/m^3
Description	Density of each baseline brick produced
Source of data	Density of common clay bricks taken from www.reade.com[44]
Value applied:	1920

[41] *http://ec.europa.eu/clima/policies/ets/cap/allocation/docs/bm_study-gypsum_en.pdf.*
[42] *With reference to the source of data (Methodology for the free allocation of emission allowances in the EU ETS post 2012-Sector report for the gypsum industry), the value has been given as 0.01 tCO2/tonne.*

[43] *Project and leakage emissions from transportation of freight (https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf)*
[44] *http://www.reade.com/Particle_Briefings/spec_gra2.html*

Justification of choice of data or description of measurement methods and procedures applied	This data has been taken from public domain (www.reade.com).
Purpose of Data	Baseline emissions calculation
Comments	The source of data is a third party publicly available source. The value can also be cross-checked from the following source http://www.simetric.co.uk/si_materials.htm

Data / Parameter	W_{brick}
Data unit	Kg
Description	Weight of each baseline brick produced
Source of data	Section 3.0 page 3/29 of the report: "Energy Conservation and Pollution Control in brick kilns" report by Sameer Maithel, N Vasudevan, Lt. Col. Rakesh Joshi (Retrd.)[45]
Value applied:	3.75
Justification of choice of data or description of measurement methods and procedures applied	Higher value of the range of weight provided is chosen for conservativeness. The source of data chosen is an authentic 3rd party source.
Purpose of Data	Baseline emissions calculation
Comments	http://www.reade.com/Particle_Briefings/spec_gra2.html http://www.cosmile.org/papers/brick_energyconservationpollutioncontrol.pdf Both the websites are authentic sources of data

Data / Parameter	$EF_{CO2,brick}$
Data unit	$kgCO_2$/brick
Description	CO_2 emission per baseline brick produced
Source of data	Page # 25of the "Brick and ceramic sectors" report by Asian Institute of Technology[46]
Value applied:	0.78
Justification of choice of data or description of measurement methods and procedures applied	Lower value of the range of CO_2 emission per brick provided is chosen for conservativeness. The source of data chosen is an authentic 3rd party source.

[45] *http://www.cosmile.org/papers/brick_energyconservationpollutioncontrol.pdf*
[46] *http://www.faculty.ait.ac.th/visu/Prof%20Visu's%20CV/Books%20and%20research%20reports/BRICK%20AND%20CERAMIC.pdf*

Purpose of Data	Baseline emissions calculation
Comments	Report by the "Brick and ceramic sectors" is an authentic source of data

Data / Parameter	$EF_{EL,plant,y}$
Data unit	tCO_2/MWh
Description	Emission factor for electricity used in project plant in year y
Source of data	Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 1
Value applied:	1.3
Justification of choice of data or description of measurement methods and procedures applied	Higher of the CO_2 emission factor for captive source (DG set) or the regional grid. Emission factor data for captive source taken from Tool to calculate baseline, project and/or leakage emission from electricity consumption, version no. 1 and emission factor of NEWNE grid taken from CEA database Version 09.
Purpose of Data	Project emissions calculation
Comments	Emission factor for CPP is taken as the default emission factor for project emission source as provided under option B.2 of the tool.

Data / Parameter	$TDL_{plant,y}$
Data unit	%
Description	Average technical transmission and distribution losses for providing electricity to project plant in year y
Source of data	Default value for project electricity source taken from ***Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01***[47]
Value applied:	20
Justification of choice of data or description of measurement methods and procedures applied	Project emissions calculation
Purpose of Data	The emission factor for project emission has been selected as the default transmission and distribution losses for project emission estimation applicable to scenario CIII. Data taken from "Tool to calculate baseline, project or leakage emission from electricity consumption", which is an authentic source.
Comments	

[47] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf *(Version 01, EB 39, Annex 07, Date: 16-May-2008)*

4.2 Data and Parameters Monitored

Data / Parameter	**Compressive strength of AAC blocks**
Data unit	N/mm^2
Description	Compressive strength of project blocks
Source of data	Laboratory test report
Description of measurement methods and procedures to be applied	Dry compressive strength of the project block would be tested in nationally approved laboratory. Compressive strength test would be carried in line with IS code: 6441 Part V.
Frequency of monitoring/recording	Monitoring frequency: Once in every 6 months Recording frequency: Once in every 6 months
Value applied:	3.75
Monitoring equipment	Compressive strength was carried out in external laboratory.
QA/QC procedures to be applied	The laboratory would comply with relevant national standards.
Purpose of data	Baseline Emissions
Calculation method	This is a measured data. Hence not applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	**Density of AAC blocks**
Data unit	kg/m^3
Description	Density of AAC blocks
Source of data	Laboratory test reports
Description of measurement methods and procedures to be applied	Density of the project block would be tested and nationally approved laboratory. Density determination would be carried in line with IS code: 6441 Part I.
Frequency of monitoring/recording	Monitoring frequency: Once in every 6 months Recording frequency: Once in every 6 months
Value applied:	550 – 650
Monitoring equipment	This test would be carried out at the laboratory (at MIL premises).
QA/QC procedures to be applied	The laboratory would comply with relevant national standards.
Purpose of data	Baseline emissions
Calculation method	Not Applicable. This is a measured data
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$P_{PJ,y}$
Data unit	m^3
Description	The annual production of the facility in year y
Source of data	Plant Records – production log book data
Description of measurement methods and procedures to be applied	Number of standard sized cakes being manufactured is being monitored manually. Number of cakes manufactured can be converted to volume units using the standard volume for each cake.
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Daily
Value applied:	300,000
Monitoring equipment	Number of blocks produced is manually counted.
QA/QC procedures to be applied	Blocks selling data and blocks stocks data can be used for verification of figures.
Purpose of data	Baseline Emissions
Calculation method	Production = (Number of cakes) x (standard volume per cake)
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$FC_{coal,y}$
Data unit	kT
Description	Quantity of coal combusted by the project activity boiler during the year y
Source of data	Plant records – Boiler room log book
Description of measurement methods and procedures to be applied	Quantity of coal consumed by the project activity boiler is a monitored source of data
Frequency of monitoring/recording	Monitoring frequency: Daily Recording frequency: Daily
Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt Ltd. Serial #:26/12-13 Accuracy class:III
QA/QC procedures to be applied	Coal stock records can be used. Quantity of coal purchased and coal inventory can be verified for the purpose.

Purpose of data	Project Emissions
Calculation method	Quantity = Opening Stock + Purchases – Closing stock
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$\mathbf{NCV_{,coal,y}}$
Data unit	TJ/kt
Description	Weighted average net calorific value of coal in the year y
Source of data	IPCC 2006 Vol 2 Chapter 1
Description of measurement methods and procedures to be applied	Higher value of the uncertainty range of IPCC default values as provided in Table 1.2 Vol 2 of the 2006 IPCC Guidelines
Frequency of monitoring/recording	Monitoring frequency: Every update of IPCC Recording frequency: Annually
Value applied:	26
Monitoring equipment	The value is taken from IPCC's publicly available report.
QA/QC procedures to be applied	IPCC data is an authentic source.
Purpose of data	Project Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$\mathbf{EF_{coal,y}}$
Data unit	tCO_2/TJ
Description	Weighted average CO_2 emission factor of coal in the year y
Source of data	Table 1.2 Vol 2 of the 2006 IPCC Guidelines
Description of measurement methods and procedures to be applied	Higher value of the uncertainty range of IPCC default values as provided in Table 1.4 Vol 2 of the 2006 IPCC Guidelines
Frequency of monitoring/recording	Monitoring frequency: Every update of IPCC Recording frequency: Annually
Value applied:	100
Monitoring equipment	The value is taken from IPCC's publicly available report.
QA/QC procedures to be applied	IPCC data is an authentic source.

Purpose of data	Project Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later.

Data / Parameter	**$EC_{PJ,y}$**
Data unit	MWh
Description	Quantity of electricity consumed by the project plant in year y
Source of data	Plant records – Electricity consumption logbook
Description of measurement methods and procedures to be applied	Separate electricity meter would be installed for monitoring of electricity imported from state grid and electricity generated by captive diesel generator sets. Electricity consumption of the plant would be calculated as summation of the electricity imports from state grid and electricity generated by captive diesel generator sets.
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Daily
Value applied:	The values have been estimated below: Period: 25-Nov-2012 to 31-Dec-2012 — Electricity Consumption(MWh): 1683.061 Period: 01-Jan-2013-31-Dec-2013 — Electricity Consumption(MWh): 75909.19 The value has been aggregated from electricity consumption log book available at plant.
Monitoring equipment	Equipment: : Energy Meter or Electricity Consumption Meter(main power supply) Manufacturer: L& T-Electronic trivector ER-300 P Serial #: 11490797 Accuracy class: 0.55 for Active ,1.05 for Reactive
QA/QC procedures to be applied	The electricity meters would be calibrated at least once in a year by internal/external agency. The electricity consumption data from grid can be cross verified from electricity purchase invoice
Purpose of data	Project Emissions
Calculation method	Not Applicable. This is a directly measured parameter
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	**$RMP_{cement,y}$**
Data unit	kT

Description	Quantity of cement purchased for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Weigh bridge installed at plant
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt. Ltd. Serial #: : 26/12-13 Accuracy class: III
QA/QC procedures to be applied	Weigh bridge would be calibrated at least annually by internal/external agency. Purchase data can be cross verified with raw material purchase invoice is a 3rd party data.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMC_{cement,y}$
Data unit	kt
Description	Quantity of cement consumed for producing AAC blocks in the year y
Source of data	Plant records
Description of measurement methods and procedures to be applied	Load cell installed at cement batcher inlet
Frequency of monitoring/recording	Monitoring frequency: Batch wise Recording frequency: Daily
Value applied:	-
Monitoring equipment	Equipment: Load Cell Manufacturer: Endeavour Serial #: 26/2012-13 Accuracy class: III
QA/QC procedures to be applied	The load cell would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Cement purchase invoices and

	cement stocks data can be used for verification of figures.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMP_{fly\ ash,y}$
Data unit	kt
Description	Quantity of fly ash purchased for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Weigh bridge installed at plant
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt. Ltd. Serial #: : 26/12-13 Accuracy class: III
QA/QC procedures to be applied	Weigh bridge would be calibrated at least annually by internal/external agency. Purchase data can be cross verified with raw material purchase invoice is a 3rd party data.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMC_{fly\ ash,y}$
Data unit	kt
Description	Quantity of fly ash consumed for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Load cell installed at fly ash batcher inlet
Frequency of monitoring/recording	Monitoring frequency: Batch wise Recording frequency: Daily

Value applied:	-
Monitoring equipment	Equipment: Load Cell Manufacturer: Endeavour Serial #: 26/2012-13 Accuracy class: III
QA/QC procedures to be applied	The load cell would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Fly ash purchase invoices and fly ash stocks data can be used for verification of figures.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	**$RMP_{Lime,y}$**
Data unit	kt
Description	Quantity of lime purchased for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Weigh bridge installed at plant
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt. Ltd. Serial #: : 26/12-13 Accuracy class: III
QA/QC procedures to be applied	Weigh bridge would be calibrated at least annually by internal/external agency. Purchase data can be cross verified with raw material purchase invoice is a 3rd party data.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	**$RMC_{Lime,y}$**
Data unit	kt
Description	Quantity of lime consumed for producing AAC blocks in the year y

Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Load cell installed at lime batcher inlet
Frequency of monitoring/recording	Monitoring frequency: Batch wise Recording frequency: Daily
Value applied:	-
Monitoring equipment	Equipment: Load Cell Manufacturer: Endeavour Serial #: 26/2012-13 Accuracy class: III
QA/QC procedures to be applied	The load cell would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Lime purchase invoices and lime stocks data can be used for verification of figures.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$\mathbf{RMP}_{gypsum,y}$
Data unit	kt
Description	Quantity of gypsum purchased for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Weigh bridge installed at plant
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt. Ltd. Serial #: : 26/12-13 Accuracy class: III
QA/QC procedures to be applied	The weighbridge would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Lime purchase invoices and lime stocks data can be used for verification of figures.

Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMC_{gypsum,y}$
Data unit	kt
Description	Quantity of gypsum consumed for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Load cell installed at lime batcher inlet
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Load Cell Manufacturer: Endeavour Serial #: 26/2012-13 Accuracy class: III
QA/QC procedures to be applied	The load cell would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Gypsum purchase invoices and gypsum stocks data can be used for verification of figures.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMP_{aluminium,y}$
Data unit	kt
Description	Quantity of aluminium purchased for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Weigh bridge installed at plant
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly

Value applied:	-
Monitoring equipment	Equipment: Weighbridge Manufacturer: Endeavour industries Pvt. Ltd. Serial #: : 26/12-13 Accuracy class: III
QA/QC procedures to be applied	Weigh bridge would be calibrated at least annually by internal/external agency. Purchase data can be cross verified with raw material purchase invoice is a 3rd party data.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$RMC_{aluminium,y}$
Data unit	Kt
Description	Quantity of aluminium consumed for producing AAC blocks in the year y
Source of data	Plant records – purchase book
Description of measurement methods and procedures to be applied	Load cell installed at lime batcher inlet
Frequency of monitoring/recording	Monitoring frequency: Every purchase of raw material Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Equipment: Load Cell Manufacturer: Endeavour Serial #: 26/2012-13 Accuracy class: III
QA/QC procedures to be applied	The load cell would be calibrated at least quarterly. The standard weight used for calibration of load cell would be calibrated at least annually by external agency. Aluminium powder purchase invoices and aluminium powder stocks data can be used for verification of figures.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$D_{f,y}$
Data unit	Km

Description	Return trip road distance between the origin and destination of freight transportation activity f in monitoring period m
Source of data	Purchase records
Description of measurement methods and procedures to be applied	Determined once ex-ante for each freight transportation activity f for a reference trip (actual purchase invoices) and using online map sources.
Frequency of monitoring/recording	Monitoring frequency: Whenever road trip distance changes Recording frequency: Whenever road trip distance changes Cement: Will be transported from Magdalla, Gujarat to the project site (approximate roundtrip distance: 300 km)
Value applied:	Following values have been applied.

Fly ash	140
Cement	300
Lime	1700
Gypsum	380
Aluminium powder	1700

Monitoring equipment	Purchase invoices and online maps are 3rd party applications
QA/QC procedures to be applied	The data is a 3rd party data.
Purpose of data	Project Emissions
Calculation method	Roundtrip road travel distances calculated from online maps
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	$FR_{f,m}$
Data unit	Tonne
Description	Total mass of freight transported in freight transportation activity f in monitoring period m
Source of data	Purchase records
Description of measurement methods and procedures to be applied	Raw material purchase and consumption will be monitored by type
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Monthly
Value applied:	-
Monitoring equipment	Purchase invoices are 3rd party documents
QA/QC procedures to be	The data is a 3rd party data.

applied	
Purpose of data	Project Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

Data / Parameter	**The vehicle class used**
Data unit	-
Description	The vehicle class used for freight transportation
Source of data	Transportation records
Description of measurement methods and procedures to be applied	Vehicle type (light/heavy) used for raw material transportation will be monitored based on road challan for raw material transported during each transportation activity.
Frequency of monitoring/recording	Monitoring frequency: Continuously Recording frequency: Every receipt of raw materials at site
Value applied:	-
Monitoring equipment	Way bill and UNFCCC guidelines[48] are 3rd party sources of data
QA/QC procedures to be applied	The data is a 3rd party data. The value can be further confirmed with the weigh bridge slip generated for raw materials inward quantity.
Purpose of data	Leakage Emissions
Calculation method	Not Applicable
Comments	All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later

4.3 Monitoring Plan

The monitoring plan would involve structure for:

- Monitoring, recording and archiving of all data required for calculation of *ex-post* emission reduction from the project.
- Storing documents required for emission reduction calculations.
- Conducting/arranging calibration tests for monitoring equipment
- Ensuring quality of recorded data
- Co-ordinating with consultants and auditors to submit monitored data to VCS Board.

The monitoring team will be structured as follows:

[48] *Project and leakage emissions from transportation of freight (EB70, Annex23, Version 01.1.0, Tool 12)* http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf

Position	Report to:
Operators	Plant head
Supervisor managers (technical/maintenance)	
VCS monitoring project manager	

Detailed responsibility of each member in the monitoring team is provided below:

#	Tasks description	Operator(s)	Supervisor	Plant Manager	VCS monitoring project manager
Monitoring activity					
1	Recording of monitored data	✓	✓		
Quality Assurance & Quality Control					
2	Verification of data monitored (consistency and completeness)		✓	✓	
3	Ensuring adequate training of staff			✓	✓
4	Ensuring adequate maintenance		✓	✓	✓
	Ensuring calibration of monitoring instruments		✓	✓	✓
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup)			✓	✓
6.	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement			✓	✓
7	Emergency procedures		✓	✓	
Calculation of GHG emission reductions and reporting					
8	Processing of data and calculation of emission reductions				✓
9	Monitoring report: management review of monitoring report (internal audit)			✓	✓

All data would be collected in paper log books and/or online data collection system and would be converted to spreadsheet form on an annual basis.

The quality of data would be ensured by periodic verification of data by VCS monitoring project manager. All data would be stored for a minimum of 2 years after the end of the crediting period or last verification, whichever occurs later. In case there is any inconsistency on monitored data, the period will be removed from emission reduction crediting period, unless sufficiently reliable alternative methods are available and validated by external agencies appointed to verify monitoring report submitted to VCS Board.

5 ENVIRONMENTAL IMPACT

The facility does not produce any pollution in manufacturing process but proposes to use the waste products like fly ash which create environmental pollution by increasing dust levels of atmosphere.

The fossil fuel consumption by the project activity is much lower, as demonstrated earlier, compared to fired clay brick manufacturing units of equivalent capacity. Hence there is positive impact on the environment due to this small scale project activity of reducing the pollution caused by fly ash and fossil fuels.

6 STAKEHOLDER COMMENTS

The various stakeholders identified for the project activity were notified and the necessary consents and approvals were obtained. This was done at various levels.

A public notice was issued by the Mohit Industries Limited management at site opinion regarding the project activity was also sought from Employees

The following stakeholders were present:-

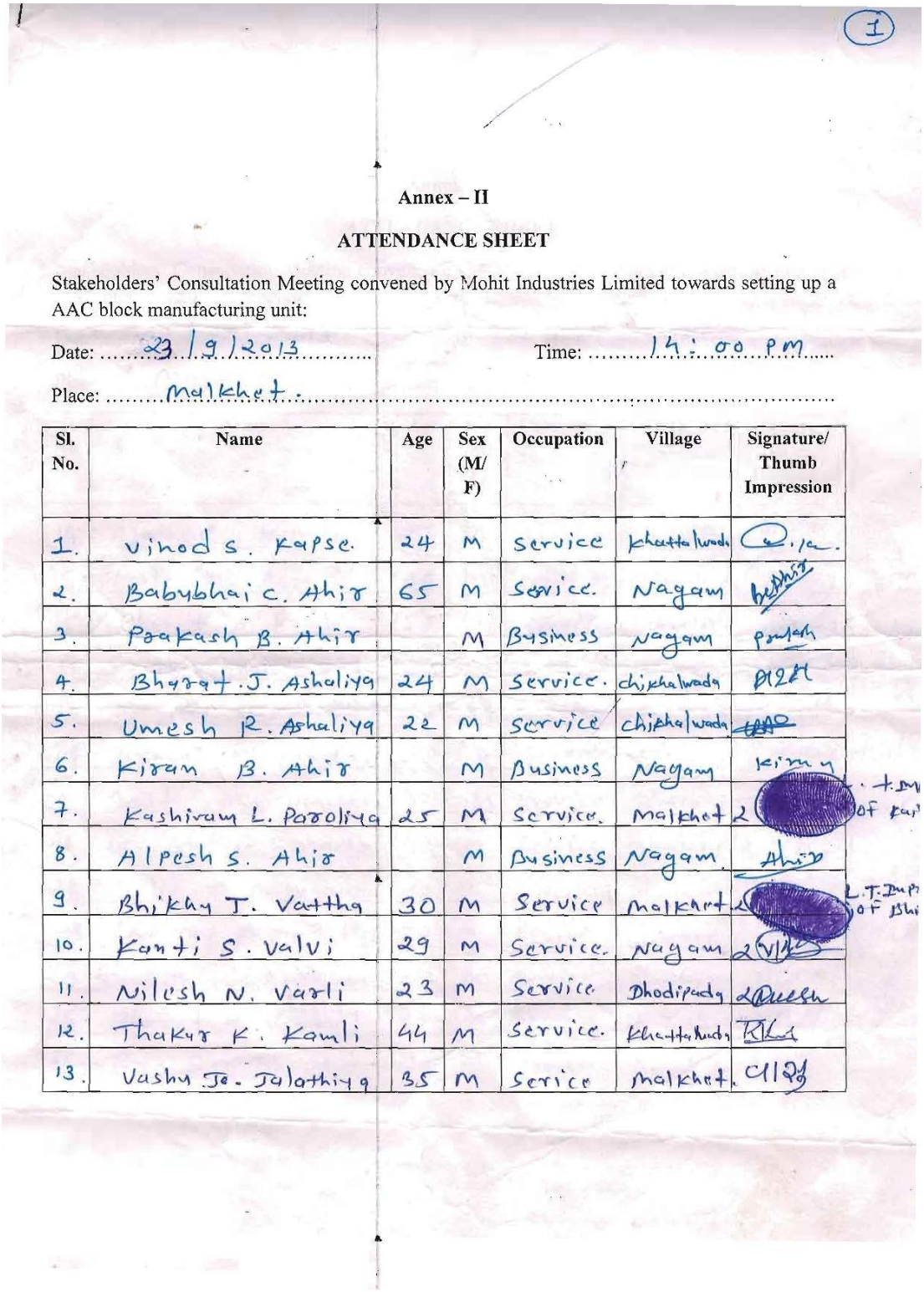
- Employees of Mohit Industries Limited
- Local People

The stakeholder consultation meeting was held at the project site at Malkhet, Gujarat on 23-September-2013 at 2:00 pm to obtain feedback of the stakeholders about the project. The stakeholders were given a brief about the project activity. Subsequently, they were explained about the project activity of AAC block,

The attendance sheet for the meeting has been attached as Annexure

As there were no negetive comments, hence no action regarding the same was taken

APPENDIX 1: STAKEHOLDER CONSULTATION ATTENDANCE SHEET



(1)

Annex – II

ATTENDANCE SHEET

Stakeholders' Consultation Meeting convened by Mohit Industries Limited towards setting up a AAC block manufacturing unit:

Date: 23/9/2013 Time: 14:00 PM

Place: Malkhet.

Sl. No.	Name	Age	Sex (M/F)	Occupation	Village	Signature/ Thumb Impression
1.	Vinod S. Kapse.	24	M	Service	Khattalwada	
2.	Babubhai C. Ahir	65	M	Service.	Nagam	
3.	Prakash B. Ahir		M	Business	Nagam	
4.	Bharat J. Ashaliya	24	M	Service.	chikhalwada	
5.	Umesh R. Ashaliya	22	M	Service	chikhalwada	
6.	Kiran B. Ahir		M	Business	Nagam	
7.	Kashiram L. Paroliya	25	M	Service.	Malkhet	
8.	Alpesh S. Ahir		M	Business	Nagam	
9.	Bhikhu T. Vaitha	30	M	Service	Malkhet	
10.	Kanti S. Valvi	29	M	Service.	Nagam	
11.	Nilesh N. Varli	23	M	Service	Dhodipada	
12.	Thakur K. Kamli	44	M	Service.	Khattalwada	
13.	Vashu Je. Jalathiya	35	M	Serice	Malkhet.	

(2)

Annex – II

ATTENDANCE SHEET

Stakeholders' Consultation Meeting convened by Mohit Industries Limited towards setting up a AAC block manufacturing unit:

Date: 23/09/2013 Time: 1.4:00 PM

Place: Malkhet

Sl. No.	Name	Age	Sex (M/F)	Occupation	Village	Signature/ Thumb Impression
13.	Ajay R. Kamli	27	M	Service.	Khattalwadi	
15.	Mulji I. Barot	45	M	Service.	Chikhalwadi	L. thumb impression of M
16.	Bharat. M. Kamli	53	M	Service	Khattalwadi	
17.	Sailesh mohan vadvi	23	M	service.	Nagam	L. thumb impression of
18.	Sanjay. G. Dhedhiya	27	M	Service.	Nagam	
19.	Jignesh M. machhi	20	M	Service	Dhasari	
20.	Amit M. machhi	32	M	Service.	Dhasari	
21.	Girish R. Machhi	42	M	Service	Dhasari	
22	Dilip. P. Mahyavanshi	40	M	Service.	Khattalwadi	
23	Gaurav A. machhi	20	M	service.	Dhasari	
24	Chandrakant S. Vasava	19	M	service	Khattalwadi	
25	Bharat S. ~~Dhadiya~~ Dhodiya Vankar	27	M	Service.	Vankash	
26.	Rajy S. Dhapsha	32	M	Service.	Chikhalwadi	

(3)

Annex – II

ATTENDANCE SHEET

Stakeholders' Consultation Meeting convened by Mohit Industries Limited towards setting up a AAC block manufacturing unit:

Date: 23/09/2013 Time: 14:00 P.M

Place: Malkhet

Sl. No.	Name	Age	Sex (M/ F)	Occupation	Village	Signature/ Thumb Impression
27	Manish .N. Saboo	30	M	Business		Manish Saboo
28	Mohit . N Saboo	25	M	Business		Mohit
29	Swati Malu	22	F	Job		Swati
30	prateek Dhameche	26	M	Job		