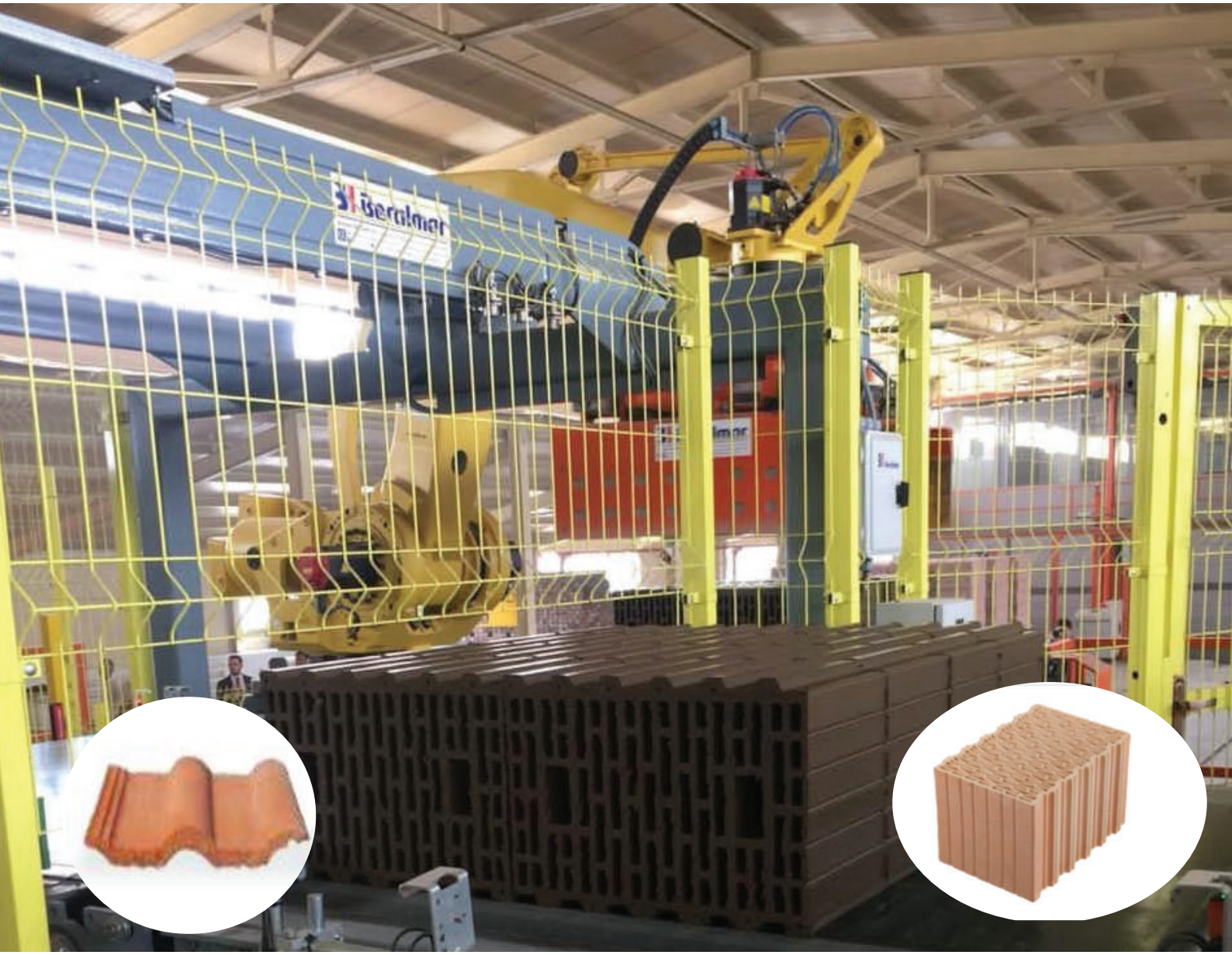
BUILD AFRICA HOLDINGS LIMITED



PROJECT PROFILE

DODOMA CLAY BRICK PROJECT

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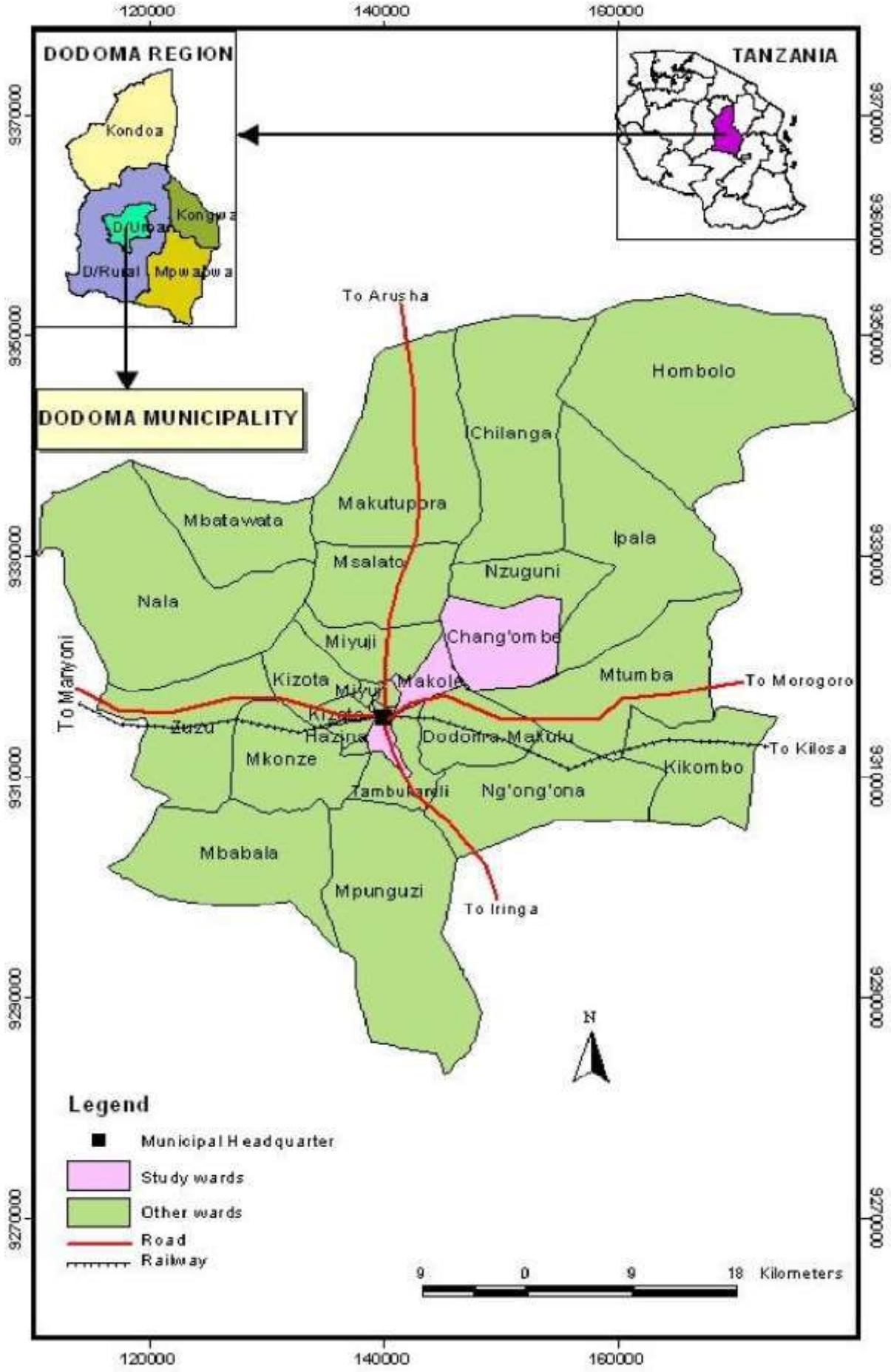
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EXECUTIVE SUMMARY

The need for sustainable human settlements in Tanzania for urban and rural residents is crucial. This is because housing is a basic need. It plays a pivotal role in economic growth and development. Housing demonstrates the quality of life and socio-economic condition of people in an economy. A house is one of the most preferred and valuable assets that provides both physical and mental strength and a psychological satisfaction, especially to the rural people who are the most vulnerable to natural hazards, pests and wild animals. Some surveys on houses conducted in developing countries indicate that in these countries priority for housing is higher than education and health (Ferguson, Bruce and Haider, Elinor 2000). However, the low segmented housing sector across most less developed countries is undeveloped and constrained by several factors; such as, high construction costs; issues relating to land, access to housing finance, fund mobilization, stringent regulatory frameworks; difficulties in procuring building materials; inadequate skilled construction workers; less awareness on access and adoption of appropriate housing technologies; and some unfavorable housing policies at international, national and sub-national levels. All of these factors generally impinge on the construction of adequate, affordable houses, both in urban and rural areas.

In this context, therefore, the provision of adequate housing, especially to the economically disadvantaged sections in Society, is a major development intervention factor across developing countries, including Tanzania. It is an even more serious issue in this country where population grows at more than 3 percent pa, and the rural to urban migration rate is very high, causing serious challenges of expanding slums and inadequate social services provisioning in undesignated areas.

Tanzania suffers from a terrible shortage of good quality houses. So dire is this shortage that, the nation currently carries a 3 million housing deficit; coupled with an annual 200,000- housing units' demand. Over seventy percent of its urban residents live in unplanned and subserviced informal settlements; with a very large disparity between urban and rural households. Two in three households in Tanzania (67 percent) live in dwellings with earth, sand or dung flooring. Cement flooring only accounts for 30 percent of households.

The main challenge in the provision of decent houses in Tanzania is seeking a substantial reduction in building costs by applying materials which are more cost effective and facilitate greater speed in construction; while ensuring that the requirements of house occupants for security, comfort and low lifecycle costs are catered for.

It is essential to apply technologies which use minimal resources due to inadequate energy and raw materials; but also, to enhance supply capacity, national competitiveness and local value-addition; as well as avoid environmental damage, waste and inefficient energy use.

More specifically, in Tanzania, bulk supply of building materials stands as a big challenge to drive down construction costs. Hence, the need for appropriate building materials and technologies is of great importance in order to drive down the total construction costs. A material which can be locally available and produced with such introduced technology allows large scale mechanized production.

It is important to stress that, building materials are the single most promising area for reducing construction costs. This is due to the fact that they account for 70% of these costs; making 42% of the total costs in constructing a typical Tanzanian 81m^2 house. In many cases, green building materials, such as clay bricks, provide significant cost savings, while offering residents superior levels of quality and comfort. Clay bricks are a highly viable alternative to vibrated cement blocks. Like many other African countries, including Zambia, Zimbabwe, Botswana, Angola and South Africa, Tanzania is endowed with rich clay deposits in various regions all over the country.

On the basis of this fact, Build Africa Holdings (BAH) Limited is seeking financial support from prospective investors to finance its **Dodoma Clay Bricks Project (DCB) in Dodoma.** The Project's key Objectives are: *first*, application of appropriate technology to manufacture clay-based building material; *second*, high utilization of abundant local resources clay deposit, natural gas for firing or coal, *third,* scale down construction costs; and, *fourth,* promote the availability of affordable housing in the country. This Project will have two Phases.

(i) **Phase I:** Project Preparations: mainly involving physical identification and geological mapping of clay deposits; fine-tuning the Project's technical design requirements; fulfilling compliance requirements, such as environmental impact assessment, EIA; and detailing the Project Plan;

(ii) **Phase II:** Factory Setting: primarily involving establishment of the Factory at the chosen site.

Context to the above Project framework, it is estimated that both Phase I and Phase II will cost around USD 24 million for putting- up a semi-automatic plant, with working capital included.

DCB Project financial projections indicate acceptable NPV and IRR to enable the project pay back initial capital cost invested full at the third year. The said NPV for this project is USD 42.6 million and IRR of 49.5% (see app. 4 & 5).

This Project, is designed to bring about a sustainable solution to the high building costs overly dependent on cement and excessive use of steel iron bars when constructing a house. The Project would involve manufacturing other essential building materials, such as roofing tiles, pavers, water tanks and joinery accessories, which are currently also inadequate.

A study conducted by SwissContact Titled "Clay Brick Production Survey SADC – 2017" revealed that Tanzania is among 11 SADC countries having abundant clay deposits, but with the lowest clay utilization rates within the region; due, especially, to the lack of appropriate technology to exploit these clay resources.

In Tanzania, currently, clay bricks are produced primarily by small-scale informal sector, using wood, charcoal and rice husks as primary source of fuel to fire the bricks. If Tanzania manages to establish even 5 clay building material manufacturing factories, more than 105,000 direct jobs would be created; including, a large number of semi-skilled labourers in the production process, brick layers, handlers, supporters, technicians, distributors and transporters.

Current dynamics in the construction industry demand necessary transformation through mechanised modenisation and product diversification, in order to exploit huge demand for green buildings in our towns and cities. This takes into consideration the fact that, Tanzania housing and construction sector is currently highly dominated by the use of cement which (as of now, is not only in short supply, but also carries some negative consequences, like excessive inhouse warming/hotness in dry seasons), needs massive combinations of other materials like steel iron bars, sand, water and gravel.

Given the above facts, it is only clay building materials which can transform the housing industry, lower building costs, so as to facilitate the construction of affordable houses in Tanzania.

Table of Contents

List of Abbreviations

NEMC	National Environmental Council
BOQ	Bill of Quantities
CAD	Computer aided Design
TBS	Tanzania Bureau of Standards
NCC	National Construction Council
OSHA	Occupation Safety and Health Authority
MCB	Miniature Circuit Breaker
DoR	Division of Responsibilities
NPV	Net Present Value
IRR	Internal Rate of Return
ROE	Return on Equity
DCB	Dodoma Clay Brick
USD	United States Dollar
PAP	Project Affected Person
ToR	Terms of Reference
ROI	Return on Investment
ESIA	Environmental and Social Impact Assessment
APPF	Afreximbank Project Preparation Facility
DSCR	Debt Service Coverage Ratio
CSR	Corporate Social Responsibility
MoU	Memorandum of Understanding
DMS	Degrees Minutes Seconds

1. Project Description

1.1 Background

Dodoma Region is located in the central part of Tanzania, having an area of about 41,311Km^2, situated between DMS latitude longitude coordinates 6°10'19.96"S, 35°44'22.09"E. It is the Region where the Capital City of Tanzania is located. The Region is endowed with a considerable wealth of natural resources; with a record of over 3 minerals of proven reserves. According to geological surveys carried out such deposits include Limestone, Clay, Heavy mineral and sand (Gypsums). These minerals have some prospect for industrial use. Currently, however, clayminerals appear not to be some of the most valuable among the minerals of the earth surface;yet they affect life on earth in far reaching ways. Clay is used in the manufacture of refractoryproducts such as firedbricks and blocks, insulating bricks, refractory mortars and mixes, and monolithic and castable materials. There are very huge deposits of clay in Dodoma Region. The clay exploration exercise undertaken in 1972 and recent surveys revealed that clay deposits inDodoma cover approximately 115.7959km^2 extending from Zuzu, Chididimo, Bihawana,Chizomoche, Isanha to Mwitikira Village in the Bahi District. In the past, two clay bricks factories were constructedd within this area.

In this context, BAH opted to establish the Dodoma Clay Bricks Factory in Mbabada Ward, Dodoma Urban District where there is a proven very large clay resource potential.

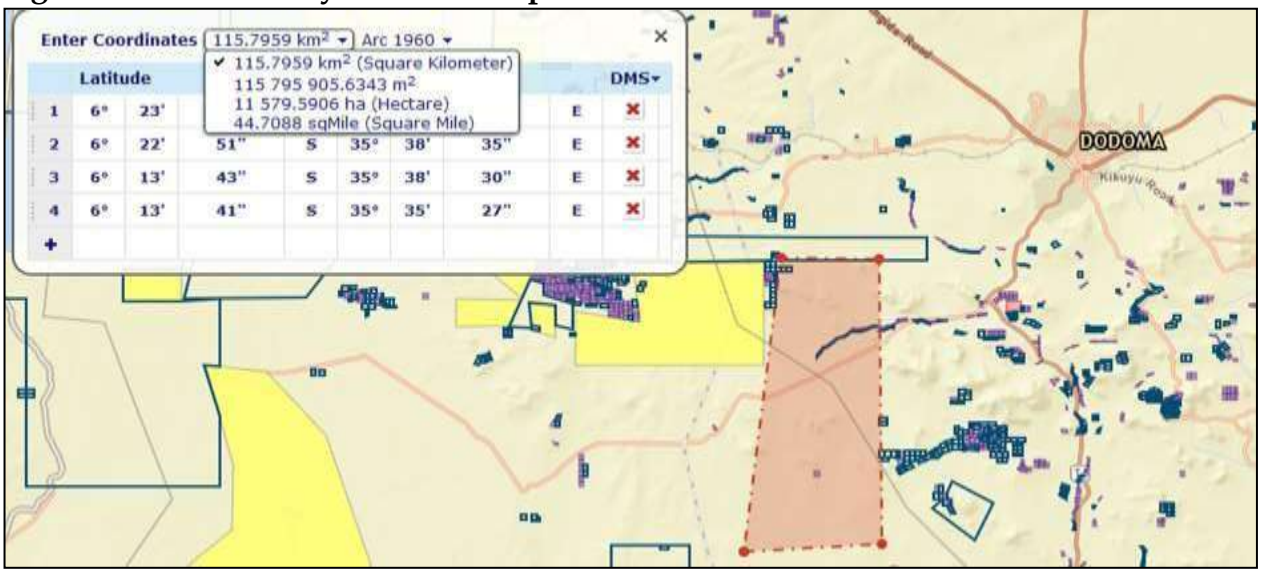
1.2 The Dodoma Clay Bricks Project

Build Africa Holdings Ltd, registered in the United Republic of Tanzania in collaboration with Beta Holdings Group, a Private Company registered in the Republic of Zimbabwe intends to establish a clay bricks factory, **Dodoma Clay Bricks (DCB)** in Mbabala Ward, Dodoma Urban District. The factory project will be implemented by SABO SA from Greece. The DCB Factory will manufacture bricks, roofing tiles, water tanks, pavers and joinery accessories using clay. With new technology, the factory is expected to manufacture 500,000 to 1,000,000 bricks per day.

When this factory is completed, it will supply its products countrywide, especially in Dodoma to cater for the Capital City Projects such as of the Modern Government City at Mtumba, Hotels, Shopping Malls, Schools and Hospitals, Commercial and Residential Houses. It is expected that, the clay building materials to be produced will drive down the construction costs, currently overly relied on cement products. There will be also greater speed in the construction process, eliminating embedded hidden indirect costs when using cement materials. More important, the clay building materials produced will largely contribute to making the Dodoma Capital a ''Green City'' through enhanced environmental conservation by the overall environmental impacts of clay bricks buildings, from initial production to overall operation; in terms of energy usage, water consumption, reduced greenhouse gas emissions and recyclability; but also reduced excessive useof sand and gravel associated with cement application.

2. Project Location

Figure 1: Dodoma Clay Location Map



Source: Mining Commission Portal - Tanzania, June 2020

Clay location area, can be reached by road, about 30km South West from the Dodoma central business district, CBD. It is located within former clay brick site used to manufacture fired bricks by Catholic White Fathers in Bihawana village.

3. Project History and Current Status

There exist many geological records available of explorations conducted in Dodoma, apart from that done by the Geological Survey of Tanganyika under the British government which indicate clay deposit sites all over the country. Build Africa Holdings (BAH) acquired data relating to the Dodoma area from various geological sources. All sources provide useful information on clay occurrence within this area. BAH has already applied for the mineral rights of the 115.79km^2 property.

3.1 Explorations

Previous work in Dodoma within the surveyed area by BAH included a Mapping Exploration Program, as the first task undertaken, to establish clay deposits and delineate clay deposits in previously unexplored areas.

The exploration exercise confirmed clay occurrence sites within the 115.79Km sq. Area; but also identified geological features which favors the formation of clay within the surveyed areas.

This work showed that there are significant geochemical targets, as well as areas of historic and current clay mining in attractive geology and structures within Bihawana Hills. Field work carried out by GST hired experts on clay exploration for two years, confirmed Dodoma to have multiple clay reserves potentials for clay bricks and tiles manufacturing, sufficient to cater for housing requirements in Tanzania, even for the entire East African region.

3.2 Project Development

Currently, the Clay Bricks Project is at a preparatory stage; total estimates for existing and forecasted project preparation costs are USD 189,022.48 and USD 612,401.34 respectively.

Table 1: Preparation Studies on Feasibility, Technical, Environmental, Designs & BOQ,

No.	Activity	Activity Descriptions	Existing	Forecast
1.	Feasibility Study	• Topographical Surveys • Geo Technical Survey • Designs – Civil • Designs – Electrical • Designs – Mechanical	34,946.20	40,312.90
2.	Clay Materials Lab Analysis	• 12 Pits/Boreholes, • 36 Bags of Clay Samples,@ 20kgs, • Export Permits and Sample Transportation; • Raw Material/Clay Investigation.	23,613.77	24,316.30
3.	Resettlement and Compensation Action Plan	• Properties identificationfor people whose landfalls within the Project area. • Baseline Socio-economic Survey, • Census of Project Affected Persons (PAPs)	-	11,294.40
4.	Projected Compensation	• 120 PAPs	-	72,867.50
5.	Environmental and Social Impact Assessment	• Site visit for data collection and assessment, • Preparation of registration documents (Scoping Report and ToR), • Project registration(NEMC), • Consultation process, • Different measurements unit samples to be taken,	20,933.20	22,576.00
6.	Business Plan	• Compliance Requirements, • Financial Projections andCosts, • Infrastructures - Availability of Water, Electricity, Roads, Manpower, Coal, Other Fuels, Clays for the Project.	47,131.65	13,448.30

7.	Environmental and Social Impact Assessment Certificate	• Obtaining Certificate from NEMC	-	17,145.30
8.	Mining License	• Obtaining Mining Licensefrom the Ministry of Minerals • Land Occupancy Charges	6,183.40	42,863.20
9.	Certificate of Incentive	• Obtaining certificate of Incentive from Tanzania Investment Centre	-	1,114.44
10.	BOQ + Other Additional Works	• Land Use Plan • Architectural Designs • Bill of Quantities	9,024.66	36,005.05
	Total		**141,832.88**	**281,943.39**

Table 2: Transaction Advisory Services

No.	Service Particulars	Existing	Forecast
1.	Technical Consultancy	14,858.60	102,251.33
2.	Legal Services	2,700.90	18,942.20
3.	Financial/Economics/Project Management Services	3,922.45	110,660.18
4.	Investments Advisory Services	2,318.05	28,478.70
	Total	**23,800.00**	**260,332.41**

Table 3: Project Management Services

No.	Service Particulars	Existing	Forecast
1.	Office Management	9,278.77	24,736.60
2.	Executive Committee -Monitoring & Evaluation	3,173.33	13,502.20
3.	Technical & Procurement Audit	4,011.10	8,886.74
	Total	**16,463.20**	**47,125.54**

Table 4: Project Marketing and Fundraising Activities

No.	Service Particulars	Existing	Forecast
1.	Investors and Lenders Meetings	5,003.70	11,601.00
2.	Seminars, Conferences & Trainings	1,005.50	10,177.67
3.	Interviews and Media Coverage	917.20	1,221.33
	Total	**6,926.40**	**23,000.00**

The Total Project Preparation Costs for the Dodoma Clay Bricks Project is USD 801,423.82 (Eight hundred and one thousand, four hundred twenty-three and eighty-two cents), BAH has already spent USD 189,022.48 (One hundred eighty-nine thousand, twenty-two hundred and forty-eight cents).

4. Project Rationale

Clay bricks have been known for centuries as one of the most sought-after and reliable construction materials for durable and decent houses. The Dodoma Clay Bricks and Tiles Project is being promoted by BAH for very compelling factors articulated below.

4.1 Cheapness and Affordability

Today's main challenge in the construction industry in Africa, is the quest to achieve massive reduction of building costs through using materials that are more cost effective and facilitate greater speed in construction; while ensuring that the requirements of house occupants for security, comfort and low lifecycle costs are catered for. Housing shortages in many developing countries, including Tanzania, have stimulated efforts to develop construction strategies which use cheap and durable local materials. It is essential to develop technologies which use minimal resources due to limited energy and minimal raw materials; but, as well as enhance supply capacity, national competitiveness, local value-addition, avoid environmental damage, waste and inefficient energy use. This Project will achieve all of the above-mentioned factors.

Estimates for CAHF Generic House with Clay Bricks

House Size: 55m^2(2 Rooms)
Bricks Size: 290mm(L)140mm(W)114mm(H)
Wall Type: double Wall

House wall & Plastering

Bricks Needed 2,754 USD:		1,081/=
Sand Needed 8Tons	USD:	350/=
Cement Needed 17 Bags USD:		148/=
A. Walling Cost		**1,579/=**

Roofing & Finishing

Roofing	USD	842/=
Finishing	USD	2,723/=
Labour	USD	474/=
B. Roofing & Finishing		**4,039/=**
Total Costs A+B USD		**5,518/=**

In this regard, the International Development Research Centre, IDRC[1] in Canada noted that one of the most promising building materials is the fired clay bricks.

Clay fired bricks can make it possible to build good quality houses quickly and at lower costs.

Residential, commercial and office buildings can be constructed in many configurations; from detached houses to high-rise apartments. However, different housing types have different implications for building costs. By far, the most common type of low-and middle-income accommodation in Tanzania, based on prevailing market preferences from buyers, are cement-built, of 2 to 3 bedrooms (detached or semi-detached) houses of 55m^2 to 100m^2. Similar to conditions in other African markets, the approximate cost structure in Tanzania for building such a unit is as follows: 60% of the unit's total costs are on construction (of which 70% are materials and 30% is labour); 10% on infrastructure (electricity, water etc); 10% on professional fees (architects, engineers, required public permits, etc.); 5% on financing; and 5% on contingencies[2] similar to CAHF generic housing costs[3].

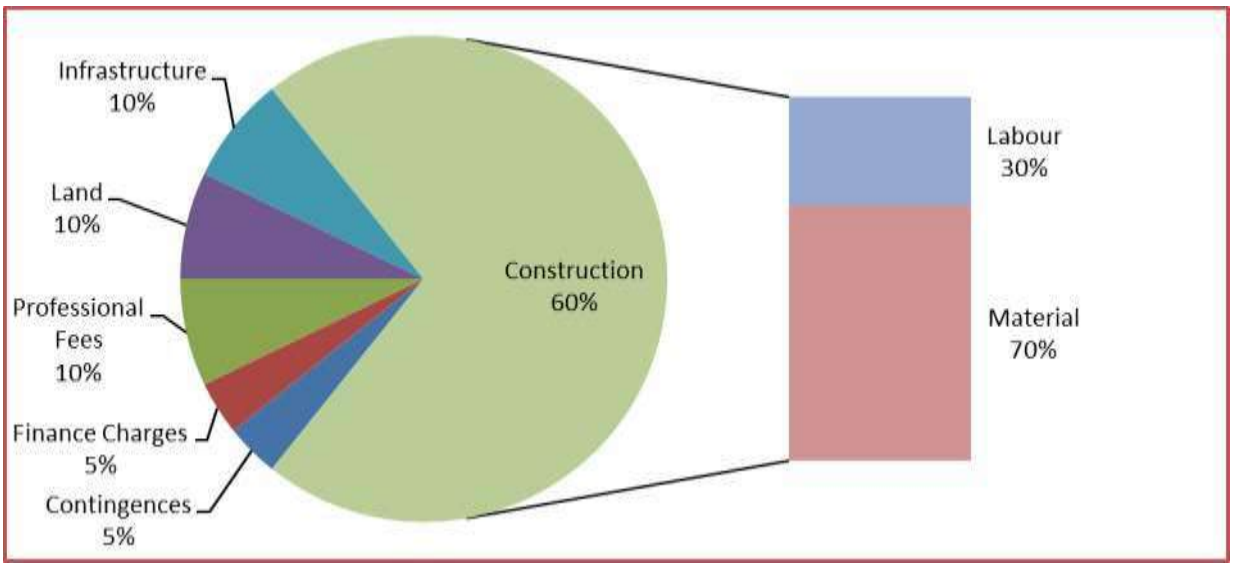
The market price for CAHF generic house is USD 60,869 using vibrated cement blocks compared to USD 5,518 when using clay bricks excluding VAT.

[1] IDRC (2007) Fired Clay Bricks - A New Technique for Production (available online http://www.idrc.ca/en/ev-3165-201-1-DO_TOPIC.html

[2] AfDB (2013) "African Housing Dynamics: Lessons from the Kenyan Market", Africa Economic Brief, Volume 4,Number 3/2013 and *fieldwork interviews*

[3] CAHF (2020) Tanzania Housing Construction and Housing Rental Activities

Fig. 2: Estimated Cost Structure of Building a Typical Tanzanian house



Source: AfDB Informal Survey of Developers 2012, Shelter Afrique Information to the Authors 2012

What clearly emerges from the above Estimated Cost Structure of Building a House in Tanzania is that building materials are the key item with the greatest potential for construction costs reduction, accounting for 42% of the total. In this context, green building materials, such as clay bricks, provide significant cost savings, while offering residents superior levels of quality and comfortable living. Contextually, BAH clay bricks are unquestionably the alternative of choice to vibrated cement blocks. The production cost per clay brick ranges between USD cents 0.08 to 0.2 Such a cost structure similarly prevails in many other African countries, such as Uganda, Zambia, Zimbabwe, Botswana, Namibia and South Africa.

A typical generic house of 55m^2 area requires approximately 3000 cement blocks, equivalent to 75 cement bags of 50kg which are commonly found in local building material outlets all over Tanzania. Cement blocks are then produced by hand shovelling and filling the appropriate moulds

The material cost including steel iron bars for this house, amounts to about US$ 4,000 (TZS 9,175,000), including about 25 tons of concrete block mix and 12 tons of sand. Alternatively, the same structure could be built utilizing approximately 2,754 clay bricks, (Double wall pattern), requiring 23 bags of cement of 50kg each and 8,748 kg of sand, equivalent to 9 tons. Building material costs using clay bricks therefore amounting to about USD 1,579 (See Table 1 below).

Table 1: Comparative Cost Structure of an 55m² House Wall

Type of Building Material	No. of Bricks	Required 50kg Cement Bags	Concrete Mix Material (Ton)	Sand (Ton)	Total Cost	
					USD Equivalent	TZS Equivalent
Cement	3,000	75	25	12	4,000	9,175,000*
Clay	2,754	23	-	9	1,579	3,615,910*

Source: BAH, 2020

* Exchange Rate: 1USD = TZS 2,290

4.2 Acoustic Insulation and Weatherproof

Apart from their natural thermal qualities, clay bricks also have highly sought-after acoustic properties which facilitate the reduction of external noise. Acoustic insulation is the ability of a wall to resist the transmission of airborne sound. The density of clay bricks provides maximum insulation against noise.

Clay bricks are rendered water resistant, making them impervious to all forms of weather conditions. They comprise of a fine capillary pore system which has the ability to absorb moisture from rain or water vapour and then release it back into the atmosphere again just as quickly. Clay bricks are the most reliable and enduring of all building materials. Few other fabricated building units have enjoyed such widespread and continuous popularity.

4.3 Cost Effectiveness

Buildings should be constructed to last; and as such, the life cycle value of a building derived from long term durability, low maintenance and energy savings, should be the key determining factors in such construction. Clay bricks fulfill all of these requirements in ensuring solid quality constructions, and offer long-term, most efficient and cost-effective solutions.

4.4 Energy Efficiency

Clay bricks are renowned for their thermal attributes that provide warmth in winter and coolerconditions in summer; thus, ensuring that energy is not squandered on artificial heating and coolingmechanisms.

4.5 Accord with Government Policy on National Housing Programme

A number of relevant policies and regulations have been designed in support of housing matters in Tanzania. In the quest for broad-based affordability and human welfare, the Government considers housing as one of the basic needs for all.

The Ministry of Lands, Housing and Human Settlements Development has been mandated to administer land and human settlements inTanzania on behalf of the President of Tanzania who serves as Trustee of all land. The 2000 National Human Settlements Development Policy is one of the policies and legislation governing human settlements and financing environment in Tanzania. The policy was developed on the Government's determination to address and reverse the deterioration of human settlements conditions in the country. The Government intends to facilitate adequate delivery of shelter and the development of sustainable human settlements in the country. Other policies include, (i) the Mortgage Finance Act; 2008, formulated to provide guiding principles for mortgage financing in Tanzania; and (ii) the Banking and Financial Institutions Regulations; 2015, issued in July 2015 (under the Banking and Financial Institutions Act of 2006) to replace the 2011 regulations.

These regulations were developed with the aim of establishing principles to govern housing finance operations for institutions involved in mortgage lending in Tanzania. Key changes made from the 2011 regulations are on minimum capital.

Notwithstanding all of these policies, the housing sector still experiences major challenges impinging on its growth and development. High construction costs, emanating from overrelience on cement products, poor infrastructure supply, high house rental charges and high housing prices under mortgage facilities are some of the challenges whichneed to be addressed.

Moreover, thus far, these policies lack national level coherence, tailored to support the housing sector in the country. Neither does the brick making industry appear to enjoy large-scale, coordinated and proactive Government support. In this context, the Ministry of Lands, Housing andHuman Settlements Development plans to present to Parliament a Bill proposing to establish a Real Estate Regulatory Authority (RERA) which will regulate the Housing Industry in the country aswell as enact a new Housing Policy in place of the 2000 Policy.

The new policy will focus at harnessing existing initiatives in housing delivery and infrastructure investment by the various actors in the public, private, informal and community sectors; as well as guide the rapid urbangrowth and transformation of settlement patterns.

This Government initiative invites the private and public sectors to invest in the construction industry, including, building materials manufacturing to make these efforts successful.

4.6 Product Durability

Durability is as an important factor in sustainable building design - the longer the building lasts the fewer materials and less energy it will consume over the long term. Clay bricks are durable and timeless building materials which complement the aesthetic and functional needs of any building. Structures that were built from clay bricks and remain standing after centuries of exposure, attest to their durability many times over.

Thus, with very little maintenance, buildings made from clay bricks can outlast many generations.

In this regard, clay bricks are the perfect material for Government infrastructure projects, including schools, clinics and hospitals. This is due to their structural and aesthetic integrity, contribution to safety, comfort and wellbeing; at lowest lifecycle costs.

Living examples of the value of clay bricks in Government projects, are the hundreds of schools that have stood the test of time including, Bihawana Seminary in Bihawana, Dodoma, Pugu High School, in Dar es salaam, former Mkwawa High School in Iringa now a University College, even the Dodoma City Municipal Council building. These are good examples to prove the value of clay bricks. In a study that was done to compare schools built by clay bricks versus Alternative Building Technologies (ABT)[4] it was found that, clay bricks walls provide better acoustics, superior thermal comfort during school hours and considerably less maintenance.

4.7 Versatility, Dimensional Accuracy and Symmetry

Clay bricks are made in a variety of colours, shapes, and textures to suit any building application. A key characteristic is the way clay brick walls and pavers remain solid and pleasing even after long term weather exposure.

Clay bricks have the highest dimensional stability and compressive strength. Deformations in buildings can lead to creeping and shrinkage of mortar, which, in turn, can lead to surface cracking due to compressive strains and temperature fluctuations; thus, jeopardizing the safety of the entire building. These cracks can be avoided by adapting the structural design to the properties of the building materials, like clay bricks which have extremely low deformation values.

[4]Will ABTs Hold the Public Purse to Ransom? – Peter Kidger, July 2015

4.8 Environmentally Friendly

Made of clay and shale, the final composition of clay bricks includes the four natural elements: earth, wind, fire and water. Therefore, they contain no pollutants or allergens and are resistant to noxious insects. They are also known to have a benign effect on the environment.

The natural insulation properties of clay bricks contribute significantly to the life cycle of a building. Clay bricks have the ability to absorb heat during the day and release it at night, thusreducing the need for artificial heating in winter and cooling in summer.

So much so, that clay bricks are the preferred choice for many residential and commercial projects.

4.9 Market Assessment for Building Material in Tanzania

The unmet demand for affordable and quality residential housing in the emerging developing world presents one of the biggest challenges and investment opportunities of our time. Comprising such major spending items as rent, mortgages, home improvements and building extensions, the total market for low- and middle-income housing in the developing world is conservatively estimated to be worth at least some US$200 billion globally over the next ten years. With stable and strong economic growth, youthful demographics and increasing urbanization, Tanzania now isfirmly part of that story.

There is the huge housing deficit in Tanzania, currently standing at 3,000,000 units; while the housing demand grows at 200,000 units per year. These figures present an enormous opportunity in the construction industry, including the supply of building materials. Across the continent, household spending on residential housing construction is estimated to be growing annually by 4.5%.

In Tanzania, a typical house of 81 m^2 requires approximately 3,000 size (5'X6') cement blocks, to build a wall, priced at Tshs. 1,600 (0.69 cents USD). This implies that:

- Housing market in Tanzania, demands 600,000,000 bricks per year.
- Swisscontact Survey in 2017 for SADC countries, indicates supply of building material for walling in Tanzania stands at 250,000,000 bricks per year; while 20% are made from clay (50,000,000), 60% from cement (150,000,000) and 20% from other sources. More than 80% of building material produced are manufactured informally, posing very high risks to safety, security and house durability because standards are compromised during manufacturing process.
- Therefore, the gap for walling building materials (bricks) is 350,000,000 bricks per annum, approximately 58% of all bricks demanded annually. That is 29 million bricks demanded per month or 1million bricks needed every day. Over 5 years 1.7 billion bricks are demanded to close the existing gap, worth USD 1.2 billion.
- New house owners in Tanzania are mainly young employees and retirees who construct houses on incremental basis. Before building the houses they first choose the right building materials on comparative basis; establish the distinguishing features like strength and durability; but, also, pricing, to see if can make savings.

- A strong cement- vibrated brick needs a combination of cement and sand at a ratio of 1:1.25:4 for cement and sand respectfully; making the per output cost be 0.51 cents USD, water and labor included; compared to 0.034 cents USD of a similar sized clay brick.
- To enable easy market penetration, BAH will apply pricing strategy, cash discounts and after sales services, like free delivery to customers within 20 km from the selling point.
- Clay brick value proposition includes bulk supply, fast building and low maintenance costs. BAH will apply market segmentation and product differentiation to secure firm position in the building material sub-sector not only in Tanzania, but within the East African region as well.

The crucial and priceless advice BAH is making to the Government of The United Republic of Tanzania (URT), with regard to the Capital City relocation, is that, for the first time in the country's history and of the East Africa region, this should be the opportunity to build a modern Green Capital City in Dodoma using clay bricks which conforms to the provisional standards of TZS 1474/EAS 54, the national and regional standards for green building materials and energy efficiency in buildings.

BAH wants to assure the Government, that, sufficient clay building materials are available. This is because, parallel to the Dodoma Clay Bricks Project, designed to manufacture 1,000,000 clay bricks daily, there is great chances to erect similar clay bricks andtiles factory in other parts of Dodoma where clay is abudant, including Mpwapwa and Kondoa, specifically to cater for Capital City building Projects. BAH believes, clay building materials willcontribute significantly to successfully achieving this noble Government goal, at reasonable cost, in time, and with the appropriate attributes of an enduring modern Green Capital City, in the face challenges emanating from inexorable climatic changes.

5. Development Impacts of the Project

Project area is surrounded by more than 70 villages with a total population of more than 150,000 people. The Project intends to contribute significantly to raise per capita income to the entire surrounding communities by providing them with employment opportunities, housing support, education support and other social services.

In general, the Project anticipates to influence positively a number of aspects as outlined below;

- **i)** It is estimated that over 200,000 workers are directly employed across the building industry in production, transportation, bricklaying and plastering.
- **ii)** Increase individual per capita income through employment opportunities;
- **iii)** Increase local development through CSR, levy and other taxes paid to the local governments;
- **iv)** Generate energy ie, electricity and supplement to the national grid, because during firingbricks process, the plant generates 4 megawatts daily;
- **v)** Increase foreign currency;
- **vi)** The project will sub contract to local SME's activities such as, catering services, cleaning and environmental activities, security services, tailoring sevices etc,
- **vii)** Provide training opportunities to local builders on the use of clay bricks;

5.1 Supporting the Community

Clay extraction has a temporary disruptive and adverse environmental impact. However, through CSR- community social responsibility, BAH is committed to provide neccessary support to the surrounding society's basic needs such as need for teachers houses, local market building, participation in wildlife and natural conservation. Restoration of clay pits can also provide land for agricultural farming, aquaculture fishing, tree planting and other productive uses.

6. Estimated Clay Deposits

The clay deposits found in the surveyed area (115.79 Km sq.) are estimated at more than 2 billion metric tonnes. This means if 1,000,000 clay bricks are manufactured per day, with measurements of one brick using 0.022 metric tonnes of clay, the clay deposits life span may take more than 50 years to exhaustion.

7. Clay Bricks Manufacturing Activities in Tanzania

Clay mining activities in Dodoma began during the colonial times, before the 1960s- 1990s period. A clay brick factory was built in Bihawana area, owned by Catholic Missionary Fathers from Italy, to produce clay bricks for building Churches and Seminary Schools within Dodoma; a good example of these include Bihawana Catholic Seminary and Bihawana Secondary School in Bihawana village, and the Catholic Cathedral in Dodoma City.

A similar factory was established in Zuzu area, owned by the former Capital Development Authority, CDA, purposely erected to supply clay building materials for the capital city development project in Dodoma.

Another clay bricks factory was in Kisarawe, owned by the Kisarawe Bricks Factory Company Limited, KIBRICO, a subsidiary company to the National Housing Corporation, NHC, to manufacture clay bricks.

Like many other state-owned parastatals, the Zuzu Factory and KIBRICO were inefficient and failed to produce the expected results. It was said that technical problems, owing to poor requirements identification, design and production; high energy requirements and poor market segmentation, propelled for their closure. Since that time, there has been no any other attempt to operate formal clay brick manufacturing activities in Tanzania.

8. Environmental Sustainability

The Project will mine and produce clay, bricks, tiles, pavers and allied construction products. Operations on site range from mining of raw clay through to firing of products and ultimate delivery to its clients.

The project recognizes its responsibilities for the wider environment and to the local community. It will comply with all relevant environmental legislations at local, regional and national levels, according to the NEMC guidelines, at a minimum performance, and act to improve the environment performance through appropriate initiatives, controls, provision of resources and training of employees. The aim is to minimize possible adverse impact on the environment of the activities, products and services.

The project will endeavor to establish extensive rehabilitation and reclamation initiatives by planting existing indigenous trees on the unused soil pits which may help

to offset possible carbon emissions generated from the operations. Subsequent to this, unused pits will be filled with water to harbor fish farming program as a means to create income to local communities and sustain their livelihoods.

9. Sources of Finance

- Government Funds
- Multilateral Funds
- Equity capital
- Bank Loan
- Joint Venture

Financing for the Dodoma Clay Bricks Project will primarily be from, equity financing covering 30% of total investment; and 70% loan.

10. BAH Vision

Build Africa Holdings Limited (BAH) is a Tanzanian infrastructural input manufacturing and distribution holding company registered in 2014.

The company's **core business activity involves mining clay and using it for manufacturing building materials-bricks, roofing tiles, pavers and water tanks, but also producing aggregates**. Parallel with this, BAH would provide logistics services to support the company's transportation needs for raw inputs such as coal and gas; as well as delivery of final products to customers. In the long run, BAH will conduct Property and Real Estate management business as supplementary to the core business activity.

BAH intends to expand into five countries within the East African region between 2023 – 2026 as part of its journey to be the dominant building materials manufacturing infrastructural firm in East Africa. The aim of the company's expansion is to leverage on the locally available immense core building materials resources for enhanced viability and profitability, accessing new markets and technologies, unlocking new capital and reducing risks. This strategy will be anchored on product quality, required customer service, end-to-end systems and technology, innovation and responsiveness to market needs.

BAH brings long-needed transformation in the building materials sub- sector, using clay as an alternative building material; leading to lowering the currently high construction costs relating to the wide use of cement; and providing bulk supply to developers and local builders.

BAH's motivating and driving Vision rests on the quest for promoting;

- Technology and equipment which reduce building construction costs;
- Optimal energy consumption;
- Construction of affordable and durable houses for the majority of the people;

- Green Cities and Settlements in urban and rural areas;
- Environmental sustainability, particularly, against the backdrop of relentless climate changes;
- Economic development initiatives through housing;
- Use for local natural resources available like clay deposit, natural gas, coal to its fullest potential.

11. Appendices

This Project Profile also contains explanatory Appendices, as follows;

- Appendix 1: Flow Chart of Production Line;
- Appendix 2: Typical Clay Products.
- Appendix 3: Actors in the value chain related to clay building materials
- Appendix 4: DCB Project NPV
- Appendix 5: DCB Project IRR
- Appendix 6: DCB Project Key Financial Performance Indicators (KFPIs)

Appendix 4: DCB Project NPV

Build Africa Holdings Limited												**Appendix 6**
Dodoma Clay Bricks Project												
Net Present Value Analysis												**USD**
(Based on a discount rate of 9.95% which the WACC)												
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Reference								
Cash inflows									
Profit before tax	Appendix 1	-	10,854,113	12,761,974	14,916,550	15,525,459	16,150,674	17,046,531	17,713,280	18,359,213
Depreciation	Annex 3 (b)	-	2,427,308	2,427,308	2,427,308	2,427,308	2,429,700	2,180,725	2,180,725	2,180,725
Residual value of fixed assets	Appendix 3	-								4,662,693
Recoupment of working capital	Annex 3 (a)	-	-	-	-	-	-	-	-	1,205,100
Total cash inflows		**-**	**13,281,421**	**15,189,281**	**17,343,858**	**17,952,767**	**18,580,374**	**19,227,256**	**19,894,005**	**26,407,732**
Cash outflows										
Investments	Annex 1 (c)	23,231,030								
Re-investments	Annex 3 (b)	-	-	-	-	112,769	-	-	-	-
Corporation tax	Appendix 1	-	3,256,234	3,828,592	4,474,965	4,657,638	4,845,202	5,113,959	5,313,984	5,507,764
Change in working capital	Annex 2 (b)	-	809,799	107,703	122,028	31,186	32,121	33,085	34,078	35,100
Total cash outflows		**23,231,030**	**4,066,033**	**3,936,295**	**4,596,993**	**4,801,593**	**4,877,324**	**5,147,044**	**5,348,062**	**5,542,864**
Net cashflows		**(23,231,030)**	**9,215,388**	**11,252,986**	**12,746,865**	**13,151,174**	**13,703,051**	**14,080,211**	**14,545,943**	**20,864,868**
NPV	**42,566,949**									

Appendix 5: DCB Project IRR

Build Africa Holdings Limited														**Appendix 4**
Dodoma Clay Bricks Project														
Discounted Cash Flows - Internal Rate Return														**USD**
Year						0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
				Reference										
Cash inflows														
Profit before interest and tax				Appendix 1		-	11,375,047	13,210,760	15,290,623	15,822,161	16,367,253	17,180,137	17,760,963	18,359,213
Depreciation				Annex 3 (b)		-	2,427,308	2,427,308	2,427,308	2,427,308	2,429,700	2,180,725	2,180,725	2,180,725
Residual value of fixed assets				Annex 3 (b)		-	-	-	-	-	-	-	-	4,662,693
Recoupment of working capital				Annex 3 (a)		-	-	-	-	-	-	-	-	1,205,100
Total cash inflows						**-**	**13,802,355**	**15,638,068**	**17,717,931**	**18,249,469**	**18,796,953**	**19,360,862**	**19,941,688**	**26,407,732**
Cash outflows														
Investments				Annex 1 (c)		23,231,030	-	-	-	-	-	-	-	-
Reinvestments				Annex 3 (g)			-	-	-	112,769	-	-	-	-
Corporation tax				Appendix 1		-	3,256,234	3,828,592	4,474,965	4,657,638	4,845,202	5,113,959	5,313,984	5,507,764
Change in working capital				Annex 3 (f)		-	809,799	107,703	122,028	31,186	32,121	33,085	34,078	35,100
Total cash outflows						**23,231,030**	**4,066,033**	**3,936,295**	**4,596,993**	**4,801,593**	**4,877,324**	**5,147,044**	**5,348,062**	**5,542,864**
Net cashflows						**(23,231,030)**	**9,736,322**	**11,701,773**	**13,120,938**	**13,447,876**	**13,919,629**	**14,213,817**	**14,593,626**	**20,864,868**
IRR						**49.46%**								

Appendix 6: DCB Project Key Financial Performance Indicators (KFPIs)

Build Africa Holdings Limited																**Appendix 8**
Expected Key Financial Performance Indicators																**USD**
							Reference									
Year									**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Project Cost																	
Total Project Capital Cost							Annex 1 (c)	USD	23,231,030								
Financial position																	
Total Net assets							Appendix 3	USD		31,260,009	38,312,163	46,826,990	55,505,611	64,543,665	74,127,809	84,094,777	97,017,735
Equity Funds							Appendix 3	USD		15,831,007	24,764,388	35,205,973	46,073,795	57,379,267	69,311,839	81,711,135	94,562,584
Long term loan							Appendix 3			13,779,198	11,678,547	9,503,182	7,250,446	4,917,587	2,501,755	(0)	-
Closing cash balance							Appendix 2	USD		7,996,683	17,149,018	27,720,519	38,618,957	49,989,149	61,653,528	73,697,716	88,694,791
Revenue and profitability																	
Revenue							Appendix 1	USD		33,600,000	38,068,800	43,131,950	44,425,909	45,758,686	47,131,447	48,545,390	50,001,752
Gross profit							Appendix 1	USD		21,446,355	24,298,720	27,530,450	28,356,363	29,207,054	30,083,266	30,985,764	31,915,337
Earnings before interest, tax, deprn & amortization (EBITDA)							Appendix 1	USD		13,802,355	15,638,068	17,717,931	18,249,469	18,796,953	19,360,862	19,941,688	20,539,938
Earnings before interest and tax (EBIT)							Appendix 1	USD		11,375,047	13,210,760	15,290,623	15,822,161	16,367,253	17,180,137	17,760,963	18,359,213
Earnings before tax (EBT)							Appendix 1	USD		10,854,113	12,761,974	14,916,550	15,525,459	16,150,674	17,046,531	17,713,280	18,359,213
Earnings after tax (EAT)							Appendix 1	USD		7,597,879	8,933,382	10,441,585	10,867,822	11,305,472	11,932,572	12,399,296	12,851,449
Profit margins																	
Gross profit margin										63.83%	63.83%	63.83%	63.83%	63.83%	63.83%	63.83%	63.83%
Earnings before interest, tax, deprn & amortization (EBITDA) margin										41.08%	41.08%	41.08%	41.08%	41.08%	41.08%	41.08%	41.08%
Earnings before interest and tax (EBIT) margin										33.85%	34.70%	35.45%	35.61%	35.77%	36.45%	36.59%	36.72%
Earnings before tax (EBT) margin										32.30%	33.52%	34.58%	34.95%	35.30%	36.17%	36.49%	36.72%
Earnings after tax (EAT) margin										22.61%	23.47%	24.21%	24.46%	24.71%	25.32%	25.54%	25.70%
Return on Capital																	
Return on Capital employed (ROCE)										44.15%	40.82%	37.84%	32.88%	29.12%	26.12%	23.71%	21.17%
Return on equity (shareholders funds) - ROE										47.99%	36.07%	29.66%	23.59%	19.70%	17.22%	15.17%	13.59%
Loan service ability																	
Loan interest cover										26.50	34.85	47.36	61.51	86.79	144.91	418.22	
Debt service coverage ratio										3.41	4.24	4.85	5.09	5.29	5.47	5.69	
Measure of indebtedness																	
Tangible assets							Appendix 3	USD		14,835,105	24,017,462	34,708,023	45,824,820	57,379,267	69,311,839	81,711,135	94,562,584
Debt/equity (Gearing) ratio (Extent of debt vs Equity funds)										0.97	0.55	0.33	0.20	0.12	0.07	0.03	0.03
Liquidity ratio																	
Liquid ratio										6.34	10.67	14.58	19.19	23.74	28.13	32.41	37.62
Quick (Acid test) ratio										5.70	10.02	13.94	18.55	23.10	27.49	31.77	36.97
Trading ratios																	
Stock turnover ratio (no. of times stocks are sold)										11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
Credit taken (no. of days of credit taken)										30.42	30.42	30.42	30.42	30.42	30.42	30.42	30.42
Credit given (no. of days of credit given)										15.21	15.21	15.21	15.21	15.21	15.21	15.21	15.21
Viability ratios																	
Internal rate of return (IRR)							Appendix 4		49.46%								
Net present value (NPV)							Appendix 5	USD	42,566,949								
Payback period - Years							Appendix 6		3.00								
Weighted Average Cost of Capital (WACC) - Assume Cost of Equity is						25%	Annex 1.3		9.95%								