EXECUTIVE SUMMARY

Introduction

The project for which this EIA is being prepared is the proposed limestone quarry in Oyo-Iwa village in Kogi State of Nigeria. The quarry is expected to supply limestone and additive material (laterite/marl) for processing of cement at cement plant, presently under construction in obajana village (about 9-km away from the proposed quarry) in Kogi State of Nigeria. The limestone quarry project is being sponsored by Dangote Industries Ltd, which is an indigenous firm headquartered at #1 Alfred Rewane road, Falomo Ikoyi Lagos, Nigeria.

Legal / Administrative Framework

In Nigeria, there are Federal and State statutory regulations that have been enacted to regulate the activities of industries with the aim of protecting the environment in the interest of all stakeholders. Several regulations, in the form acts, edits, byelaws, ratification of conventions, etc. have been put in place to cater for environmental and social compliance by industries.

EIA Terms of Reference/Objectives

The terms of reference for this report are as follows:

- To determine the baseline environmental status of the proposed limestone quarry project.
- Identify and analyse the potential environmental and socio-economic impacts of the proposed mining project
- proffer amelioration/mitigation measures to identified environmental impacts
- Prepare a comprehensive environmental management and restoration plan

In pursuance of the above terms of reference, the scope of study includes:

- Limestone mining activity
- Limestone crushing and conveyor belt
- Mine access road rehabilitation project

Specifically, the objectives of the EIA are as follows:

- provide information and evidence required for developing an Environmental Impact Statement (EIS) for the proposed project;
- establish baseline conditions of the proposed project location;
- Identify hazards and impacts associated with the seismic data acquisition;
- recommend preventive, reduction and recommend control measures for identified potential/associated adverse impacts of the development project; and
- develop a cost-effective Environmental Management Plan (EMP) for the lifetime of the project.

In compliance with statutory requirement, and company good practices, DIL has carried out an EIA of the proposed limestone quarry project in line with EIA

procedural guidelines of the federal ministry of environment, Nigeria. Therefore, DIL avows that the EIA was conducted using EIA best practices.

Project area/site
The proposed quarry project shall be located on 527.045 hectares land belonging to Oyo-Iwa communities in Kogi state of Nigeria. The proposed project shall be located at Oyo in Lokoja local government area of Kogi state of Nigeria. Oyo is located about 9 km off Zariagi – Kabba road, at a junction adjacent to the proposed obajana cement plant.

Kogi state is endowed is characterized by guinea savannah vegetation consisting of a mixture of trees, shrubs, herbs and grasses. The proposed quarry area is dissected by river Mimi which is a tributary of River Niger. The climate is tropical, hot and moist, with the rainy season usually lasting from May to October.

Need for the Project
The need for the project emanates from the need to produce cement locally to satisfy Nigeria's cement needs. Although limestone deposits abound in Nigeria, currently only a few cement manufacturing industries are exploiting any for cement production. The limestone deposit at Oyo – Iwa is needed to supply the raw material needs of the obajana cement complex, which is already under construction.

Value of the Project
The value of the limestone quarry project is tied to the value of the proposed obajana cement plant it will feed. Obajana Cement Company (OCC) is expected to produce about half of the current cement consumption in Nigeria, and the OCC project shall engulf >US$700 million in investment. The quarry is within 9 kilometers distance from the Obajana cement plant and since proximity to raw material is a factor in selection of industry, the proposed limestone quarry project is valuable.

Envisaged Sustainability
Based on the details obtained from exploratory survey, an estimated 119 million tones of limestone exists in the Mining Lease Area (MLA). Apart from limestone, it is estimated that there is approximately 29 million tones of additive materials In addition, preliminary investigations indicate the occurrence of about 450 million metric tones of limestone and 112.5 million tones of additive materials in 6 other Exclusive Prospective Leases (EPLs) held by Dangote Industries Ltd (20 km^2 each). This gives a tentative total of 569 million tones of limestone and 119 million tones of additive materials in the area (present MLA plus 6 EPLs). The present available limestone reserves of both inferred and measured category is expected to last, at the proposed daily limestone requirement of 16,500 metric tones, for >90 years. However, the cement plant is proposed to last for 50 years, therefore, the project is sustainable.

Project alternatives considered

Alternative 1: A 'no project' scenario means there shall no mining of limestone. The implication of this option is that obajana cement plant will have to source

limestone from elsewhere. Since 95% of the raw material needed for cement production is expected to be derived from the proposed quarry, a 'no project' option as well means no obajana cement plant. This is not acceptable since it would exclude all the benefits derivable from the execution of the obajana cement development project. Therefore this option was rejected.

Alternative 2: This option was not accepted because it negates the very concept of boosting domestic production of cement. Besides, it would constitute a drain on Nigeria's foreign reserve and it is more expensive to produce cement from imported limestone due to high shipping/insurance costs and port charges.

Alternative 3: This option entails the execution of the proposed project, which entails mining limestone from a dedicated quarry. In addition to limestone, the needed additives would also be mined from this quarry. The quarry shall be located within 9 km distance to the proposed obajana cement plant where the limestone shall be processed into cement. This option was accepted because it shall make the processing of cement locally, and also present an opportunity for transfer of technology, when Nigerians learn skills during the construction, operation and maintenance phases of the cement development project.

Scope of the Project

The scope of the project involves mining, production and development of 527,045 hectares of limestone deposit with its associated. The details include the following:

- Construction of approach ramps and mine ramps;
- Mining operation (drilling, hauling/transportation, blasting, crushing activities among others);
- Construction of a 7.5 km conveyor belt for conveying crushed limestone and additives;
- Rehabilitation of the existing Obajana - Oyo road, and construction of mine access roads;
- Infrastructural developments- construction of approach roads and buildings;
- Maintenance of roads; and
- Reclamation, aforestation and rehabilitation programmes.

Process Description

Conceptual Mining Plan: A conceptual mining plan based on technical and economic considerations has been put in place to ensure a sustainable mining operation. The entire deposit shall be mined up to 45m depth. The block shall be mined section by section, so that as one section is exhausted, it shall get refilled by waste generated from adjacent section. The mining operation shall be phased: Phase I shall involve the initial mining operation at south of River Mimi while phase II shall succeed Phase I and shall be at the south of River Mimi.

For the first 5-year period, preparatory works shall be carried out (within first six months) and full-fledged mining operation shall start. A 440m approach ramps (and mine sumps) shall be constructed, from crusher top to the mine, for the transportation of limestone and additives. The ramp shall have a width of 30m at the top and gradient of 1:20 and shall consume about 97000 m^3 of earth material.

During the second 5-year period, there shall be no overburden removal but mining of limestone. The limestone will be mined from 2 levels viz 250-235 RL and 235-220 RL. The approach ramp formed during the pervious period will be extended up to +220 RL and then the face will be pushed in all direction up to the ultimate pit limit. At the end of 10th year the south block will reach its ultimate level.

In the third 5-year period, the area mining will shift to the north of River Mimi and a new set of approach ramps will be needed to access the mine pits, about 7 million tones of overburden will be removed up to the ultimate pit limit. Prior to that, the top soil (arable soil of first 0.3 m) will be removed first and will be spread in the overburden dump for reforestation, followed by removal of rest of the soil and other overburden. Out of the 7.0 million tonnes of overburden material around 3.62 million tonnes will be utilized as corrective material and the remaining 3.38 million tonnes will be used to refill the exhausted portion south block and to form the bund along the diverted course of River Mimi. An area about 13 hectares at south eastern corner of the pit will be refilled up to +265 RL. The top soil removed during this period will be stored separately to be used for reforestation.

For the fourth 5-year period, the approach ramp formed during the third 5-year period shall be deepened up to +220 RL, while the limestone bench 250-235 RL will be moved up to the ultimate level and then followed by 235-220 RL bench. Since the overburden is removed up to the conceptual limit there will be no further overburden removal during this plan period. At end of this period the entire limestone up to the economic level will be mined and the pit will attain its conceptual limit. The top arable soil stored during the first five years period will be spread over the refilled area and then afforested.

Mining Activities/Process: The activities/processes for the mining operations include:

- Clearing of bushes over an extent of about 900,000 sq metres;
- Mining to a maximum depth of 45m;
- Scrapping and storing of the top arable soil of 0.3m thick in the bush cleared areas;
- Removal and storage of other top soils around 1.5m height for future; aforestation purpose;
- Formation an approach ramp to reach the floor of one beach (+250RL);
- Landing the ramp in the floor level and mining al the overburden along with some limestone above this level(+250RL); and
- Stacking the mines limestone separately for future use.

Drilling Activities: The drilling activities shall be carried out by two Nos of self propelled crawler mounted Atlas Copco make ROC LB DTH drill for blast hole drilling. The features of this drilling equipment include:

- Capability of drilling up to a depth of 54m;
- Possession of facility of optimal interchangeable which shall allow of hole diameter of either 150mm or 115mm as per the requirement;

- Equipped with sophisticated in build electronic system which will provide better accuracy of drilling depth, inclination, etc and aid to obtain better blasting and to maintain uniform bench floor,
- Equipped with dust extraction and collection system- this facility will completely eliminate air borne dust generated during drilling operation;
- An inbuilt water tanker having a capacity of 220 litres of water to enable wet drilling where ever it is required;
- Provision of an audio visual alarm in the machine to warn the people in the vicinity while reserving of the machine; and
- Further deepening of the ramp to reach the floor of the next bench through same system described above.

Blasting: The blasting practices which shall be adopted are as follows;

- Each blast hole will be loaded with suitable size explosive cartridges, which include cap sensitive explosives (primer) and non-cap sensitive explosives (column).
- In dry holes, ANFO will be used in place of or in addition to non-cap sensitive explosives.
- Deck charging system will be adopted, when the strata exhibits variation in rock hardness, thereby reduce the explosive charges per hole and top of the hole for about 1.75 metres will be stemmed with suitable stemming material which will prevent generation of fly rocks, noise and vibrations.
- A powder factor of around 6.00 – 8.00 tonnes per kg of explosive in limestone is expected.

Hauling: For the hauling purposes, 10 nos. 90 tonnes dumpers and 8 nos. of 40 tonnes dump truck shall be used for limestone, additives and reject handling. The equipment shall be transported on a well laid road that shall be constructed and maintained.

Crushing: The limestone will be transported to the crusher, which shall be installed just adjacent to the mining area. The distance between the point of entrance of the mine to the crusher hopper will be around 400m. Two crushers having the capacity of 2000 tph and 400 tph, for limestone and additives respectively, shall be established: HazeMag Model APPMH-2530/GSK rotary impact crusher for limestone and Bedeschi crusher for additives. The output size of each crusher will be around 80mm. The crusher will be conveyed by a bet and shall pass through the Gamma Matrix Cross belt analyser, in transit to the conveyor belt.

Belt Conveyor: The crushed materials (both additive and limestone) shall be transported from the point of crushing to the stacking area in the factory via an approximately 7.5 km long conveyor belt. The conveyor shall be covered protect against the weather conditions.

Baseline Environmental Characteristics

Climatic Characteristics: the climate of the proposed quarry project site is characteristically Guinea Savanna, which is typified by a variable mixture of trees, shrubs, tall grasses and herbs in a mosaic pattern. Rainfall lasts from May to

October, with dry season occurring in between. Wind speeds range between 3.0 and 4.6 Knots in the months of June/ July, and 1.5 to 3.7 knots for December/January and the winds prevailing direction for the months of June/July and December/January are South to South westerly and North Easterly respectively.

Air Quality: The concentration of suspended particulate matter in the area showed seasonal variations: it is low (5.0-10.2 ppm) for the wet season, but much higher during the dry season (10.6 to 17.2 ppm). . The concentrations of the pollutant gases such as SO_2, NO_2, NO, CO and H_2S were found to be not detectable (<1.0ppm).

Surface Topography: The mine areas are defined by hills in form of ridges tending to north south direction. The terrain is very rugged and comprise of quartzite ridges sometimes rising as high as 100 meters above the low lands. The highest elevation is to the north eastern part of the area, which is about 310 meters above sea level, while the southern part has the lowest elevation of 255 meters above sea level. The area is drained mainly by River Mimi and its tributaries forming a dendritic pattern of drainage that discharge into the River Niger.

Geology: The regional geology of the study area consists of basement complex rocks predominated by strongly folded gneisses and metasediments. The rock type found in the study area includes of schist, pegmatite, quartzite, limestone, granite and granulites. The schist that outcrops extensively along the access road to the site is of two varieties: mica schist and quartzo-feldspatic schist. In the south, quartz, quartzite cobbles/pebbles and ferrugenised quartzite boulders and cobbles occur extensively, while north east of the area, extensive migmateschist outcrops can be found. The limestone is roughly north-southwest trend, thinning out in the south-west direction. The limestone is gray to white in colour, medium to coarse-grained in nature with few mica specks. In some places mica schist and granite intrude into the limestone. An overburden of 2 to 8 meters thick of soil overlies the limestone.

Surface Water: River Mimi is the only surface water body found in study area. The river is a semi-seasonal river, flowing during the rainy season and some part of the dry season, but ceases to flow at the peak of the dry season. The pH averaged 6.48 for both dry and wet season, while values for conductivity, TDS, TSS and hardness varied widely. Generally, the water is relatively hard, with apparently non-detectable nitrate concentrations. The average values for dissolved oxygen ranged from 6.2 to 6.5 mg/l, which is indicative of an aquatic medium that is capable of supporting life. The BOD_5, which is a measure of the organic load in a system, was low 1.2 mg $O_2 l^{-1}$, indicating that the water is not polluted by organic materials. The phosphate content of the surface water ranged from 4.82 – 7.42 mg l^{-1}. Generally, the results of the chemical analysis of water samples shows that surface waters in the quarry area were not polluted at the time of this study.

Sediment Characteristics: The sediments found in River Mimi were generally sandy with ph in the range of 5.20 to 6.24. The total nitrogen content varied from 0.02 to 0.05%, organic carbon, 0.19% to 0.54% while organic matter content ranged from 0.45 to 0.66%. The various parameters measured showed a similar trend during both dry and wet season.

Soils: The texture of the soil is generally loamy sand, porous and prone to erosion. The pH of the soils ranged from 5.09 to 5.77 for wet season and 5.53 to 5.82 for the dry season, with total nitrogen content in the range of 0.03% to 0.16%. Nitrate levels in soils ranged from 6.75 to 9.25mg kg^{-1}, while phosphate concentrations varied between 7.14 and 10.14 mg kg^{-1}. There were very minimal seasonal differences in the values soil phosphate.

The organic matter content of the topsoil varied from 0.69% to 4.21% with no remarkable seasonal differences. The heavy metals contents were relatively normal for mineral soils, except Pb and Fe, which appeared high.

Vegetation Type: The vegetation type can be broadly classified as Guinea Savannah with typical tree species that include *Lophira lanceolata*, *Terminalia glaucescens*, *Daniella oliveri*, *Hymenocardia acida*, *Vitex doniana*, *Detarium microcarpum*, *Afzelia africana*, *Acacia senegalensis*, and *Parkia biglobosa*. Amongst the grasses/herbs, the common ones are *Andropogon* sp, *Hyparrhenia* sp, *Pennisetum* sp and *Chromolaena* sp. Whenever the canopy is open, grass is dominant. In general, the average tree height in the area ranges between 6-8m while the grasses have an average height of 0.8-1.5m. Riparian vegetation can be found along the banks of River Mimi; and the common riparian species identified include *Pterocarpus santalinoides, Brachystegia eurycoma, Berlinia grandiflora, Terminalia glaucescens* and *Cola laurifolia*.

Baseline Socioeconomic Conditions

Ethnography/History: The proposed quarry area is located within the territories of Oyo and Iwa communities and is called Oyo-Iwa land. Although the two communities are physically separate, they are essentially two 'clusters' of the same communities, with common heritage and land ownership. Iwa is a small nucleated settlement strung east-west along the Lokoja – Kabba road, while Oyo is situated 9 km north away from Lokoja-Kabba road, teeing off from Obajana. Oyo and Iwa land were founded by two brothers who stayed some 7 km apart so that their people would have room to farm but they did not divide their father's land. After a while, the two settlements moved farther apart but the resources of the land continued to be jointly owned till today, with the same festivals, culture, language and beliefs.

Culture and Beliefs System: The people of Oyo-Iwa are called Oworo and the claimed to have originated from the Yoruba ethnic group. The Oworo people have a rich culture embedded in the dietary system, language, religion, songs, music, festivals, values, etc. Most (>90%) of the indigenes, and Bassa group, are Christians, while all the non-indigenous Hausa/Fulani populations are Muslims. Overall, Oyo is said to be 70% Christian, 20% Muslim and 10% Traditionalists. In Oyo there is a church and a mosque and both Christians and festivals are observed in Oyo/Iwa. In addition, there is the New Yam festival, which is

celebrated once a year in all the Oworo villages on every 6th day of July. The new yam festival is associated with a deity called *Asuweye* that is responsible for ensuring soil fertility and good harvests. Sacrifice of chickens and goats to this deity for thanksgiving is accompanied by dancing *Asuweye* masquerades. Indigenes are not allowed to eat new yam until this festival has been celebrated for that year.

Another very important festival in Oyo and Iwa is the *Emoga*, which is the deity responsible for peace and general welfare. It is celebrated once a year with sacrifices, masquerades and dancing with plenty of food and drinks. In case of special occasions or disasters, this particular deity is appeased through sacrifices. The land on which Oyo settled was blessed this way before the first houses were built. While non-indigenes can take part in the celebration of *Asuweye*, that of *Emoga* is restricted to indigenes. The Oba (called Obaloo in Oyo, Eleso in Oyo) is also the chief priest and celebrant for the two ceremonies. Other ceremonies include traditional rituals and ceremonies accompanying weddings, celebrations births, deaths, and achievements, etc. There is also the belief in unseen spirits and the society is conceptualized as consisting of the dead, the living and the unborn, and that the spirits of the departed still influence the living.

Traditional Political Structure and Governance: The traditional head of Oyo is the Obaloo, who is assisted by twenty-five (25) chiefs in the Village Council. Each council has a Village Council Secretary, who keeps minutes of meetings, deals with correspondence and is the Chief Messenger for the Obaloo. The Village Head (Obaloo) and his council oversee all traditional aspects of the life of the people such as maintaining peace and order, resolving conflicts, observing cultural festivals, organizing community work, etc. The Obaloo and the Secretary are responsible for external relations, while the Oba is also responsible for allocating farmland to migrant farmers, and adjudicates in case of conflict. There is a Youth Leader and a Women Leader who represent their respective constituencies, who attend Village Council meetings to present matters of importance to their groups. Old women are very influential in both communities and play a major role in ensuring the spiritual health of the community. This role is behind the scenes and they deal directly with the Oba. There is also the Oyo-Iwa Development Association (OIDA – Oyo and Iwa have a joint association) and Oyo-Iwa Students Union (OISU).

Population/Ethnic Composition: According to the 1991 National Population Census, the Oyo settlement had a population of 272 people. This was projected to 391 at this current year (2004). However, community respondents estimate that their total population stands between 2,500 and 3,000 at the time of this survey (September 2004). The ethnic composition comprising the native Oworo, Tiv, Fulani, Hausa and the Bassa who arrived four to five years ago, being displaced from their old houses in Nasarawa State by ethnic conflicts.

Marital Status /Household Size: Most households are large in an extended family system. Most men 25 years and above are married, while all women of 23 years and above in are married.

Most families are polygamous, with wives and children helping with farm work. The Hausas and Fulani never have more than the four (4) wives as allowed by their religion (Islam), while the Ebira and Bassa marrying up to 6 wives. Majority of households have between four (4) and nine (9) children.

Occupations: farming is the dominant occupation and provides 90% of all cash income. Other occupations in Oyo-Iwa include cattle rearing, civil service, trading, hunting, carving, and artisanship.

Land Ownership and Access: In Iwa and Oyo, land is communally owned. The Eleso of Iwa and Obaloo of Oyo exercise more than supervisory authority over the land. They are the landowners as heads of the original clan that made up Iwa and Oyo. The core clan members of the communities have more than mere usufruct rights. They can plant tree crops and harvest economic trees except timber. Other indigenes (long standing migrants who have spent over 20 years and behaved well) have usufruct rights and can farm anywhere, as much as they want and plant what they want but cannot harvest economic trees. They also do not pay any form of token rent whatsoever. Permission is obtained from the Obaloo and Eleso to plant economic trees of oil palm, cocoa and coffee but cashew can be planted freely on their crops. The Oba is the owner of all naturally growing economic trees and approves the cutting of timber trees without reference to the Village Council. He exercises authority over the land as its owner and makes decisions over granting land for public projects.

Income Levels: It is extremely difficult to obtain accurate data on income levels, because there are no records, and also the Oworo tradition does not favour the disclosure of wealth. However, the migrants are considered to be richer as they are able to mobilize more resources for farming. In monetary terms, however, both the indigenes and the farmers are relatively poor when compared to inhabitants of bigger towns like Lokoja.

Market System: While Iwa has an organized market, Oyo has none, hence Oyo people go to the neigbouring villages like Iwa, Obajana, Jakura, Lokoja, etc., to buy and sell goods. There were only two small shops seen during the survey, which sold detergent powder, soaps, sweets, biscuits, chewing gum, salt, granulated sugar, exercise books, Coca-Cola drinks, etc. There is also a medicine store. The main marketing event is the 5-day market at Felele, Lokoja. A day before market day, traders move along with their produce to Lokoja to participate in market operations the following day. Thereafter, they buy items for their household needs and return in evening of the market day. The men usually engage in the bulk sales of produce (yam, cassava, pepper, etc), while women engage in retail trading. In the local markets of Iwa, only women indigenes can be seen selling things. By tradition men do not go to market to sit and sell and purchase of foodstuffs, soup condiments, kerosene, washing soap; etc is traditionally left to women.

Educational Facilities: Iwa and Oyo have one primary school each. However, many Oyo people send their children to schools in Lokoja where they stay with relatives. There is, however, no secondary school the nearest is at Odo Ape 9

km west of Iwa. Most Oyo students attend secondary school at Odo Ape, Lokoja, and Kabba.

Health: Neither Iwa nor Oyo has any standard health care facility. Patients depend totally on local medications. Also, traditional birth attendants provide maternity services. There is a small patent medicine store opened in Oyo that sell a few human and veterinary drugs. The people of Iwa go to the neigbouring Oshokoshoko where there is a clinic and medicine store. Those that can afford it travel to hospitals in Lokoja or Kabba for their healthcare problems.

Transport: Iwa is located on the Lokoja – Kabba highway that has provided good access for residents of the community. The major complaint about transport is its escalating costs especially in the last two years, which resulted from the policy of deregulating the downstream sector of the petroleum industry in Nigeria. Oyo is about 9.5 km Obajana, teeing from the Lokoja-Kabba road.

Electricity/Water Supply: Neither Oyo nor Iwa has access to electricity supply. Illumination of homes is provided using kerosene fired lamps and cooking is with fuel wood. There is no source of potable water supply and the communities depend on rivers, rainwater and hand-dug wells for their water. The river/streams in the project-affected communities are however, seasonal and thus dry up in the dry season thereby compounding the water situation.

Processing Mills: all the communities have traditional graters for processing cassava. In recent years, itinerant owners of motorized graters come to Iwa to provide services to women. However, such is not yet available at Oyo. The motorized grater is estimated to accomplish the combined work of 30 women in one day. Those who use them pay for processing on load-by-load basis and payment is allowed in cash or in cassava. Oyo and Iwa each have a local grinding mill for processing guinea corn, maize, millet, dried yam and cassava into flour.

Perception of Benefits/Impacts: The people identified a number of positive and negative impacts. The positive impacts that shall accrue to the people of Oyo and Iwa are listed as follows:

- ✓ The assurance of the President of the Company to provide electricity, water (boreholes), health clinic, classroom block and scholarships to Apata, Iwa, Obajana and Oyo is seen to be the greatest news for the communities in the last 100 years.
- ✓ Indigenes of Iwa have earned good money by renting rooms to migrant workers, and also selling land. In Iwa room rent has also gone up by 200% with over 100 factory workers living there. They also sell their agricultural products at better prices and some do not need to go to Lokoja.
- ✓ The employment given to indigenes of the four villages is also appreciated.
- ✓ In Iwa the supply of water by tankers to communities by the Julius Berger Construction Company has eased water shortages and reduced the time spent to fetch water from streams by women.

- ✓ Oyo people have easier access to Obajana than before, once they are able to cross the Mimi River to the section of the road improved by the Company.

Despite the above beneficial impacts, the people have expressed some negative impacts and concerns. These include the following:

- There is about 200% inflation in the prices of goods in Iwa. They included rise in transport costs which they did not link with increasing fuel costs, even though there have been several fuel increases in the past 2 years, which also coincided with the start of project activities.
- Non-indigenes are taking most of the jobs and dominate most of the businesses. The inability of indigenes to raise money to start business is of major concern.
- Although not alarming yet they have begun to see evidence of increased crime (fighting, drunkenness and theft) because of a large number of migrants many of whom are not known, neither can they be monitored.
- Most people mentioned the possibility that migrants might bring many diseases that are not common in the area as a critical problem.
- Safety problems, as number of big trucks used in construction work has increases and risks of traffic accidents to local folks.
- Change in culture and values. Most people fear that the culture and values of their people would be lost over time. Already general respect for elders, decent dressing and chastity are being eroded.

Community Concerns: Group discussions generated the following causes of discontent and apprehension:

- Insufficient interaction between the Company and the various elements of the communities.
- There is ill-feeling towards the Land Use Act (1978) and the Minerals Act (1979 reviewed 1999) vest all land and minerals in Nigeria in the Government and thus make indigenous peoples tenants.
- Although some employment has been done, it is not considered enough to dampen their impatience.
- Dissatisfaction with the method of assessment and payment of compensation for crops and economic trees on land taken by the Company.

Community Expectations: Views on expectations of what the proposed quarry project would bring to the people were unanimous and people ranked them in the following order of priority:

- Pipe borne water supply
- Primary Health care centers/clinics
- Electricity supply
- Security (Police) Post
- Extension of the mine road to Oyo
- Establishment of a credit scheme to increase investment in farming, businesses, and registering with the Company as cement distributors when production starts.
- The Oba of Oyo requested for assistance to build good palaces.

The people perceived that the provision of these facilities would lead to a better quality of life by eradicating poverty. There was very clear evidence of the expectation that the factory was going to automatically supply them with all the good things of life and their problems would be over once and for all.

Beneficial Impacts

The proposed project is expected to have positive effects by contributing significantly to the development of not only the locality, but also the nation at large. Benefits include:

- flow of investments to the area, increase employment to the villagers (both skilled and semi-skilled) and community development for the inhabitants of the study area.

- The mining project will provide both direct and casual employment to approximately 150 persons. Due to availability of income, there could be some positive impacts on the lifestyle when the natives take up jobs under the project.

- Opportunities for commercial activities will be created in the area in the form of increased local sourcing of food, equipment, housing and tools. The project will lead to increase in water recharge, as more rainwater will infiltrate through the dug trenches/pits. In addition, the company will dig water trenches for the use of the local villagers, which is a beneficial effect.

Adverse Potential Impacts

- During construction, bush clearing shall result in vegetation loss and exposure of topsoil to agents of erosion if not properly mitigated. Also, loss of vegetation cover shall lead to loss of terrestrial habitats thereby affecting the abundance and diversity of terrestrial species. Other losses would be in loss of hunting grounds and non-timber forest resources, which is an important source of income to the people.

- To open the mine, a thick overburden layer would have to be removed, which if not properly managed, could increase the sediment load of the adjacent River Mimi, as well as increase the rate of erosion.

- There is the possibility of pit lakes being created at the mine site after mine closure. These shall constitute major health hazards and disturbances / alterations of pre-mining water quality and quantity, which may lead to surface and groundwater contaminations.

- During mining operations, groundwater shall be channelled to a sump and eventually pumped out into a surface stream for drainage. Even though the ground water may not contain excessive amounts of total dissolved salts, metals, and other chemicals than the stream waters, and therefore, the risk of contamination is minimal, there shall be a surplus discharge of water via the stream. This will alter the ecological balance of the recipient stream, and

possibly create breeding grounds for disease vectors, which may exacerbate certain existing ailments like malaria or introduce new diseases.

- Land degradation due soil erosion damage, deforestation (removal of fauna/flora through bush cutting, road clearing, digging of trench/pits), and changes in landscape, visual intrusion and changes in hydrology of the area. Others include emission of noxious gases, land use conflicts, legacy impacts (direct and indirect negative impacts), and disruption to community by change and influx of newcomers.

- One impact expected is the cumulative effects of a series of operations mining, crushing and conveyance, taking place leading to change of the pattern of land-use from agriculture to mining, and this will lead to loss of farmlands and disruption of means of livelihoods, including the physical displacement of some persons along the conveyor route . This impact shall be significant and long-termed.

- With the creation of the trenches and pits, there is likelihood of creation of additional breeding grounds for disease vectors such as mosquitoes, snails, etc. If unchecked this may result in increase in the diseases carried by these vectors e.g. malaria (mosquitoes) and bilharzias (snail).

- Common health problems that may directly arise as a result of the mining include shock, nasal infections, asthma, catarrh, cough, and sinusitis. This will have a significant mitigable adverse impact on the mineworkers and people in the locality and their livelihoods.

- Due to sudden economic activities in the area, there may be a large influx of workers and people in search of gold and mass return of indigenes residing in cities. In addition, an increase in the number of traders and hawkers of food is also expected in the area.

- There is potential for conflicts especially when migrant workers are insensitive to the local culture. As a result of influx of more people, there is a high risk of unacceptable sexual behaviours that will lead to the spread of STDs, like HIV/AIDS.

- Occupational safety and health in terms of dust/exhaust fumes inhalation, rock falls and trench collapse, effects of noise and vibration, poor ventilation, and effects of over exertion, inadequate work space and inappropriate equipment. All these are likely going to occur but can be mitigated.

Potential impacts	Mitigation/Amelioration Measures
• Erosion hazards due to bush clearing & soil disturbance.	• Erosion control measures will be put in place, which will in the form of protecting exposed surface by vegetating. Bush clearing will be done according to land space requirement so as to avoid the generation of large biomass at the same time. Cleared vegetation will be stacked off the path of run-off water to avoid being carried into the stream course.
• Impacts associated with mine pit lakes.	• About 13 hectares in areas south of the mine will be refilled up to +265 RL and the remaining will be used as water reservoir to be used for reforestation and other purposes. The overall pit slope will be maintained around 45^{O} to avoid bench failure, and the pit lakes shall be useful in groundwater recharge
• Impacts associated with overburden removal	• The surface soil layer shall be stored separately from the rest of the overburden. The entire periphery of the mine shall be banded and garland drainage provided to avoid inrush of surface water during rainy season.
• Possible impacts on groundwater during mining	• Provision of sump to accommodate any seepage, and for settlement of suspended solids, and the water shall be pumped into a settling tank for desiltation before discharge into the stream. Also bund garland drainage shall be provided on the entire periphery of the mine and sides of the stream and River Mimi to avoid inrush of surface water during rainy season.
• Impacts associated with mine water discharge	• Mine water discharge shall be carried out only when there is excess water in the mines. The natural river flow shall be considered to avoid the possibility of flooding downstream
• Impacts associated with blasting	• Optimum spacing of boreholes to avoid flying fragments. Minimisation of vibrations using millisecond non-electric delay detonators. Use of less detonating fuses to avoid plaster shooting, and timing of blasting to minimise noise impacts.
• Loss / disruption of livelihoods/ physical displacement of persons.	• A resettlement Action Plan has been prepared according to IFC's OD4.30, which shall form the basis for livelihood restoration. After exploration, trenches and pits will be covered.
• Creation of breeding grounds for disease vectors.	• Inspect for the presence of disease vectors and help in strengthening of local health facilities through public enlightenment and direct contributions in terms of provision of infrastructures, etc.
• health problems associated with dust / atmospheric emissions	• Use of covered conveyor. Landscaping of exposed areas / use of water browsers to control dusts. • Machinery shall be maintained in good conditions to minimise emissions.
• influx of people in search of employment and market speculators	• A comprehensive influx management and community development plan shall be put in place to cover the entire cement development project of which this project is a component part.
• Escalation of HIV/AIDS issues in locality	• Workers shall be enlightened about STDs, especially HIV/AIDS and will be instructed to control their conduct. Also, workers will be sensitized on the cultural sensitivities of the host community.
• Occupational safety and health impacts	• Hazardous working conditions will be eliminated. Health clinics shall be put in place and ambulances provided for emergency evacuations

Environmental Management Plan

Ecological Impacts	Mitigation Measures	Action Party	Monitoring Parameter
• Erosion hazards due to bush clearing and soil disturbance	• Protection of exposed surface through landscaping. • Bush clearing will be done according to land space requirement • avoid blockage of run-off water	• Operations Crew • HSE Unit	• Records of landscaping • records of housekeeping • Records of bush clearing
• Impacts associated with mine pit lakes.	• Maintain adequate bench slope to avoid bench failure.	• Operations Crew • Environmental Unit	○ Pit lake water quality
• Impacts associated with overburden removal	• Store surface soil separately • provide garland drainage to avoid inrush of surface water during rainy season • stacking of overburden on barren non-mineralised rock to minimise degradation • ensure appropriate overburden stack designed to avoid erosion	• Operations Crew • HSE Unit	○ photo records of spoil heap ○ evidence of drainage ○ records of stack volume ○ records of dump inspection
• Possible impacts on groundwater during mining	• Create sumps to accommodate seepage and for settlement of suspended solids • Pumping of water into settling tank for desiltation before discharge into the stream • provide bund garland drainage around the periphery of the mine, sides of the stream, and River Mimi to avoid inrush of surface water	• Construction Crew • Operations Crew • HSE Unit	○ Records of water pumping ○ Pit water quality ○ TSS content of pit water
• Impacts associated with mine water discharge	• discharge only when there is excess water in the mines, i.e., during the rainy season • Consider the natural river flow so as to avoid the possibility of flooding downstream	• Operations Crew • HSE Unit	○ Volume of discharge ○ Quality of discharged water
• Creation of favourable habitats for the growth and proliferation of disease vectors	• Monitor the presence of disease vectors • Strengthening of local health facilities through public enlightenment and direct contributions in terms of drugs, provision of infrastructures, etc.	• Management • Operations Crew • HSE Unit	• Presence of disease vectors • Records of diseases
• Impacts associated with blasting	• Avoid flying fragments during blasting • Minimise ground vibrations • Control noise by using less detonating fuses • Avoid plaster shooting, and • Carry out blasting during shift intervals.	• Construction Crew • HSE Unit	• Records of blasting operations • Timing of blasting

	• Use of rock breaker to down size bigger boulders instead of secondary blasting.		
• Loss of farmlands / disruption of livelihoods	• compensation in the form of direct monetary payment to affected people • Encourage farmers to buy alternative land to farm. • Rehabilitate land after mine closure	• Management • Community • Construction crew	• Records of land take • Records of compensation • Records of resettlement
• health problems associated with dust / atmospheric emissions	• use of covered conveyor belt • landscaping/restoration of exposed areas • use of water browsers to control dust • maintenance of machinery	• Management • HSE Unit • Operation crew	• Operation of conveyor belt • Records of maintenance • Records of water browser use
• influx of people in search of employment and market speculators	• A comprehensive influx management and community development plan shall be put in place to cover the entire cement development project of which this project is a part.	• Management • HSE Unit	• Records of Job seekers • Records of employment • community complains
• Escalation of HIV/AIDS issues in locality	• HIV/AIDS campaign • HIV/AIDS issues in HSE Manual • Sensitize workers on cultural sensitivities	• Management • HSE Unit • Government • NGOs	• HIV/AIDS awareness • Records HIV/AIDS campaigns • Evidence of HIV/AIDS in staff HSE Manual
• Occupational safety and health impacts	• industrial safety and heath practices in place • elimination of hazardous working conditions • personnel protection measures/equipment • emergency procedures in place	• Management • HSE Unit	• safety records • evidence of HSE procedures • evidence of PPEs

Environmental Monitoring Plan

Parameter	Stage of Project	Frequency
Weather conditions	Operation	Daily
Dust emissions	Construction/Operation	Weekly
Air pollutant	Construction/Operation	Weekly
Noise levels	Operation	Daily
Terrestrial Biodiversity	Operation	Twice a year
Aquatic Biodiversity	Operation	Twice a year
Overburden Heaps	Construction/Operation	Weekly
Runoff water	Construction/Operation	Weekly
Mine pit drainage water	Operation	Weekly
Community perceptions	Operation	Annually
Waste management practices	Operations	Monthly
Road traffic safety	Operation	Monthly

Top Soil Management/Land Reclamation

Topsoil shall be carefully removed and preserved to be used for land reclamations. Vegetation shall be established and maintained on all reclaimed lands for the purpose of beautification and as a measure to prevent soil erosion.

A green belt shall be established in and around the mine work areas. The greenbelt shall be designed to stabilize slopes, prevent erosion, control dusts, enhance aesthetics, and reduce noise. The optimum size of green belt is shall depend on expected pollution loads from the mine, wind direction, availability of land, etc.

Solid Waste Management

The waste generated during the mining operations will be used to construct the peripheral bund around the mine lease area. After the completion of embankment, the reject will be dumped on stable ground in non mineralized area. The solid waste bund so created will be of trapezoidal cross section with a height of around 19 m with a natural angle of slope (37.5°) and when the dump yards being formed exceeds 30 metres, it will be adequately benched. The slope of the bund will be stabilised and finally aforestation shall be carried out on the bund. At the final stage of mining operations, all the dumps will be properly stabilised and afforested, with garland drainage provided all along its periphery.

Decommissioning/Abandonment

Decommissioning of the project will as such be done as follows:

- In the first 5-year phase, removal of topsoil and formation of approach ramp will take place. An area of about 14 hectares will be re-vegetated around the mines office, workshop and the area adjacent to crusher.
- At the end 2nd 5-year stage, the south block would have been exhausted and ready for refilling and about 10 hectares will be re-vegetated.
- In the third 5-year Plan Period, an area of about 13 hectares at southeastern corner of the pit exploited for additive on the non-mineralized area will be refilled up to +265 with materials from the reject dump located in the south

block. The top arable soil stored during the first five years period will be spread over the refilled area and then re-vegetated. The remaining mined out area will be used as water reservoir.

- In the fourth 5-year plan period, there will be no developmental activity. Mining activity, which started in the area north of River Mimi in the third phase, will continue until the lowest bench is achieved. However, the re-vegetation of the refilled portion of the pit (about 13 hectares) will continue during this period.

At the expiration of the useful life of the project, all movable assets will be removed and either sold or used for another quarry. Almost all the equipment and machinery may be used for other industrial purposes. All plant facilities and machinery that will not be deemed to be of further use will be sold off as scrap materials.