

ESIA SUMMARY

PROJECT NAME :

**ESTABLISHMENT OF 5,600 TPD CLINKER CAPACITY GREENFIELD
CEMENT PROJECT AND OPERATION OF CAPTIVE MINES**

**NEAR DERBA VILLAGE,
OROMIYA REGIONAL STATE,
FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA**



COUNTRY: ETHIOPIA

PROJECT NUMBER :

DEPARTMENT :

DATE :

ESIA SUMMARY

1. INTRODUCTION

MIDROC (Al-Muwakaba For Industrial Development and Overseas Commerce) is a large company having many business interests in Ethiopia, Saudi Arabia and other countries.

DERBA MIDROC CEMENT PLC is proposing to establish a green field cement plant of capacity 5,600 tonnes per day (tpd) of clinker (cement capacity of 7500 tpd) based on Derba limestone deposit in Ethiopia.

This ESIA Summary outlines the Summary of the Environmental and Social Impact Assessment (ESIA), the Environmental and Social Management Plan (ESMP) and the Resettlement Action Plan (RAP) formulated for the proposed project, which includes the cement plant, captive raw material mines, proposed roads from the plant to the mines and from Derba village to the plant, belt conveyor from mines to plant, water pipeline and the power transmission lines.

2. PROJECT DESCRIPTION

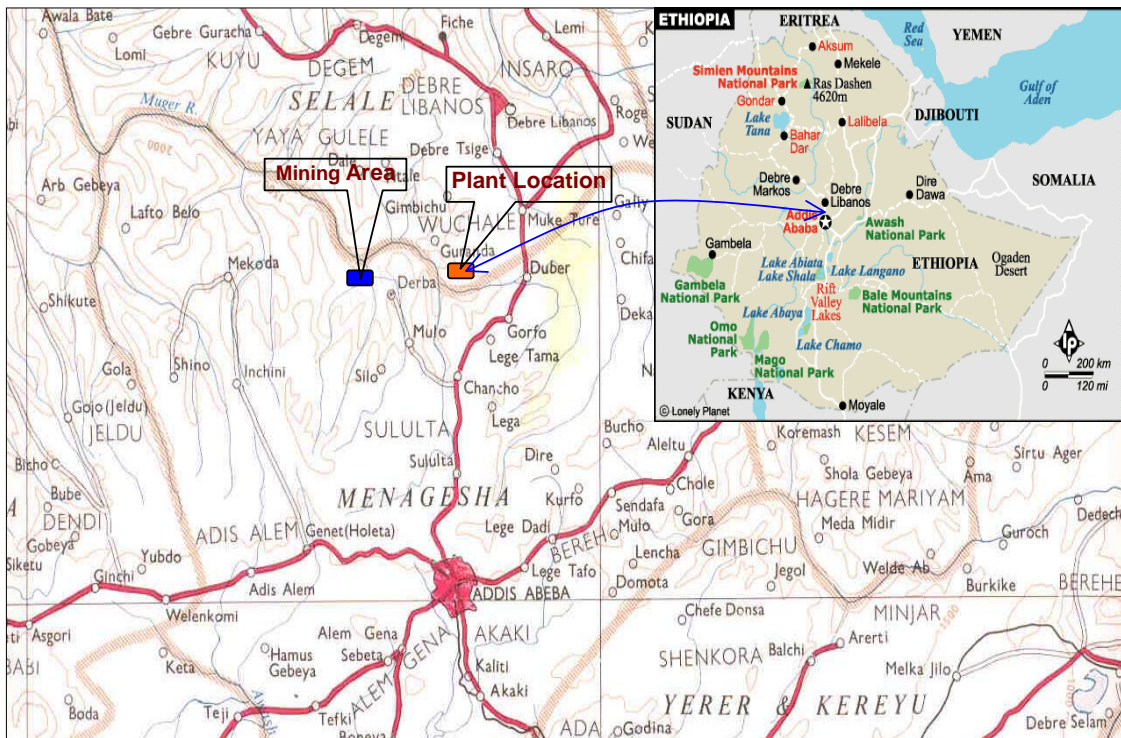
The cement plant is proposed to be located about 8 km from Derba village in Sululta Wereda in Shoa Zone of Oromiya Regional State. The proposed mining area is located within the Anda Weizero Peasant Association in Sululta Wereda, Shoa Zone of Oromiya Regional State and is about 7 km (crow fly distance) from the plant site.

The Derba Cement plant site is about 70 km from Addis Ababa the capital of Ethiopia. The coordinates and elevations of the plant and mining areas are given below. The project location is shown in the map below.

Coordinates : Latitude : 09° 27'28" to 09° 28'25" N : Longitude : 38° 34'31" to 38° 35'23" E

Elevation of Plant site : 2380 m to 2420 m above Mean Sea Level (MSL)

Elevation of Mining area : 1550 m to 1650 m above MSL



Ordinary Portland Cement (OPC) and Portland Pozzolana Cement (PPC) will be manufactured at the DMC Plant. Both the cements shall meet the requirements of Ethiopian National Standard No. EN-197. OPC shall be produced as per CEM-I - 42.5 grade and shall contain 95% clinker and 5% gypsum. PPC shall be produced as per CEM-II - 32.5 grade and shall contain 67% clinker, 28% pumice and 5% gypsum. The annual cement capacity of the plant shall be 2.46 million tonnes per annum.

Cement consumption in Ethiopia during the period 1997-2007 has grown well, with a Cumulative Annual Growth Rate (CAGR) of around 10% per annum (pa). In the last 5 years, the growth rate was around 16.1% pa.

The cement consumption for the year 2006-07 is estimated to be around 2.05 million tonnes. The demand supply gap for cement has been estimated as given below.

Year	Demand (million tonnes)	Supply (million tonnes)	Gap (million tonnes)
2007	2.05	1.75	0.30
2008	2.66	2.01	0.65
2009	3.38	2.82	0.56
2010	4.19	3.50	0.69

The proposed plant capacity is primarily based on market considerations and the availability of raw materials. The proposed location enjoys the twin advantage of proximity to raw material sources as well as market offered by the Addis Ababa, which is the capital and largest city of Ethiopia. Addis Ababa is also an important trade center of East Africa.

DMC is expected to command a market share of around 37% in its 1st year of operation, which will increase to 41% in its 4th year of operation. The plant will achieve 100% capacity utilization in its 4th year of operations.

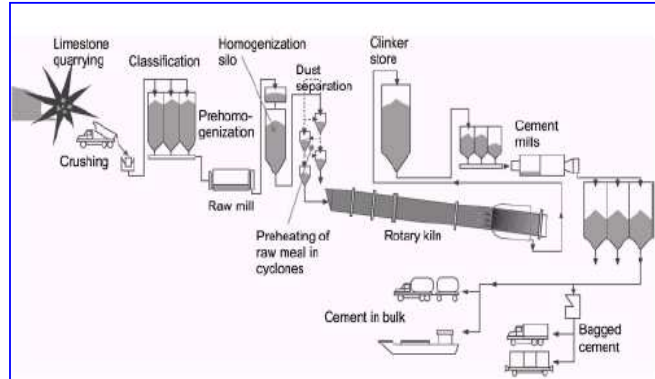
The raw material and fuel requirements for the proposed plant are to be met from different sources as given below.

Sn	Material	Source Locality	Distance from plant (km)	Remarks
Raw materials				
1	Limestone & Marl	Mugher	6.5	The crusher, located in the mine, would be connected to the plant by a 7 km long belt conveyor.
2	Clay	Mulu Seyo	18	Considered as a corrective.
3	Sand	Mugher	15	Considered as a corrective.
4	Basalt	Near Gimbichu	10	Considered as a corrective.
5	Gypsum	Mugher	15	Considered as an additive
6	Pumice	Dera Ararate/ Nazerat	125	Considered as an additive
Fuel				
1	HFO	Middle East	-	Transport by sea up to Djibouti port, land transport 925 km
2	Imported coal	South Africa	-	

The limestone deposit at present is accessible by about 12 km foot track from Derba Cement plant site, which is situated at a distance of 70 km from Addis Ababa.

The deposit is surrounded by Mugher river and its tributaries. Due to the natural topography of the area, the limestone deposit lies in the valley (1550-1650 m above MSL) whereas the flat area where the plant is proposed to be located is at an altitude of 2380-2420 m above MSL. There is a sharp fall in elevation of approximately 800 to 850 m between the plant and the mining areas.

The best available technology, which is the dry process, shall be used for manufacture of cement. Cement manufacturing consists of raw meal grinding, blending, calcining to form clinker and cement grinding. In short, limestone and other materials containing calcium, silica, aluminium and iron oxides are crushed and milled into a raw meal. This raw meal is blended and is then heated in the pre-heater to initiate the dissociation of carbonate to calcium oxide and carbon dioxide. The meal then proceeds to the kiln for heating and reaction between



The manpower requirement for operation of the proposed plant is estimated as 474.

UTILITIES

The maximum power demand for the proposed plant is estimated at about 45 MVA. The power demand will be met from the national grid. The main feeder line passes near Chancho, where a sub-station will be constructed and a power line drawn over 20 km.

Water supply will be met from ground water sources. Borewells will be located near Mulo Seya village around 16 km away and pipelines will be laid up to the plant. The total requirement of water for the project including drinking and sanitation is around 2,000 m³/day.

No wastewater is generated from process and cooling as the total water undergoes evaporation during the exchange of heat. Wastewater generation from the plant will be mainly comprised of cooling water from DG sets and domestic wastewater from plant and colony. The treated effluent shall be used for spraying on clinker and coal wetting. A Sewage Treatment Plant (STP) to treat sewage effluent will be installed. The STP will cater to the plant and colony both and will have a capacity of 300 m³/day.

A residential colony to provide accommodation for plant personnel will be built. The colony will have facilities like a health centre, school, shopping complex, recreation centre, guesthouse, gymnasium, sports playgrounds, etc.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The ESIA study for the proposed Cement project has been carried out within the framework of local, national and international environmental regulations. The legislative framework applicable to the proposed project is governed by the Federal Democratic Republic of Ethiopia (FDRE), Africa Development Bank (AfDB), International Finance Corporation (IFC), European Investment Bank (EIB) and the Development Bank of Ethiopia (DBE).

3.1 REGULATORY FRAMEWORK OF FDRE

Ethiopia adopted its Constitution in 1995, which provides the basic and comprehensive principles and guidelines for environmental protection, and management in the country.

The FDRE consists of the Federal State and Regional States. Proclamations 33/ 1992, 41/ 1993 and 4/ 1995 define the duties and responsibilities of the Regional States which include planning, directing and developing social and economic development programs as well as protection of natural resources.

The Environment Protection Authority (EPA) has established an Environmental Impact Assessment system for Ethiopia including the preparation of Procedural and Sectoral Guidelines as a prerequisite for the approval of new development activities and projects. The EIA Process as applicable to development projects is detailed in the 'Environmental Impact Assessment Procedural Guidelines Series 1' of November 2003. As per Schedule I of the Guidelines, both cement plants as well as mining projects have significant environmental impacts, and, therefore, require a full EIA/ EA study.

The Derba Cement plant will be responsible for implementing environmental management plans at its facilities in coordination with the Federal EPA and the Regional EPA for Oromiya Region. The environmental performance of the project will be monitored on a regular basis through **DMC's** own set up and through external/ third party audits.

3.2 IFC/ WORLD BANK GUIDELINES

The proposed cement project falls under Category A as per IFC Performance Standards and its procedures for project appraisals. The WB and IFC provide detailed guidelines for the EA process. As of April 30, 2007, new versions of the World Bank Group Environmental, Health and Safety Guidelines (EHS) are in use. The EHS Guidelines also include sector specific:

- ❑ EHS Guidelines for Cement and Lime Manufacturing
- ❑ EHS Guidelines for Construction Material Extraction

In addition, IFC's eight Performance Standards, viz., Social and Environmental Assessment and Management System; Labour and Working Conditions; Pollution Prevention and Abatement; Community Health, Safety and Security; Land Acquisition and Involuntary Resettlement; Biodiversity Conservation and Sustainable Natural resource Management; Indigenous People; and Cultural Heritage, will be adhered to throughout the operation of the project.

3.3 AFRICAN DEVELOPMENT BANK GUIDELINES

As per the Environmental and Social Assessment Procedures of AfDB, the proposed cement project including its associated raw material mining operations and utility connections is classified as Category 1. The projects assigned to Category 1 require a full ESIA, including the preparation of an ESIA report and ESMP.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

In order to assess the baseline environmental status in the study area around the proposed project area, a primary and secondary data collection programme has been undertaken during the period July-Aug 07. The environmental components studied include:

- ❑ Physical/ chemical components: Physiography, Geology, Geomorphology, Hydrometeorology, Hydrogeology, Surface and Ground water resources, Climatology, Meteorology, Ambient Air Quality, Noise Levels, and Soil quality.
- ❑ Land use, archeology and cultural heritage
- ❑ Biological environment: Flora and Fauna
- ❑ Socio-economic components: Demography, education system, agricultural system and livestock, transportation networks and other infrastructure like water supply, public services, health status and medical facilities.

4.1 TOPOGRAPHY & DRAINAGE

Topography of the project area and of the surroundings consists of plains, mountains and valleys. The drainage of the project area is governed by the catchments of Blue Nile River, particularly Mughher river, which is one of the tributaries of the Blue Nile. Mughher river flows

west of the proposed plant site in a deeply incised valley, which is at an elevation about 800 m lower than the plant area.

4.2 CLIMATE

The climate of the area is characterized by two distinct seasonal weather patterns; the wet season extending from June to September, contributing about 70% of the annual rainfall, and the dry season which covers the period from October to May. The minimum and maximum temperature in the area vary from 9°C to 23.5°C. The average relative humidity during the year is 62%. The mean annual rainfall in the area is about 1158 mm.

4.3 HYDROLOGY

A detailed hydro-geological study has been carried out in the area. The groundwater recharge of the study area of 10 km radius around the plant and mining sites is estimated at 25 mio m³/ year. The total existing abstraction in the area is 5.1 mio m³/ year, which is only 20% of the available groundwater resources. The net available ground water in the area is 19.9 mio m³/ year. Thus it is safe to extract water from the area to meet DMC's total water requirement of 0.73 mio m³/ year (~2000 m³/ day).

4.4 WATER QUALITY

Surface water samples from three (3) rivers, three (3) springs and a river confluence and ground water samples from six borewells in the area have been analysed for their physico-chemical properties. All samples are within the stipulated WHO/ Ethiopian Standards.

4.5 AMBIENT AIR QUALITY

The ambient air quality has been monitored at site and at various locations within the study area during the period August-September 2007. The average total particulate matter in the area varied from 42.5 –118.8 µg/ m³, PM₁₀ varied from 13.3-54.4 µg/ m³, SO_x varied from 19.5-24.4 µg/ m³ and NO_x varied from 6.3 –9.5 µg/ m³ at the monitoring stations located at Plant site, mines, Derba & Lilo villages. All values are within the draft Ethiopian AAQ standards.

4.6 NOISE LEVELS

The noise levels were monitored at four locations within the study area during August-September 2007. The average daytime and night time noise levels have both been recorded as 42 dB(A) and are well within the IFC and draft Ethiopian standards.

4.7 ECOLOGY

4.7.1 Flora

The vegetation composition, abundance, cover, and other relevant ecological information of the areas has been collected. The study has covered both the core area, i.e., the plant and mining sites, as well as the buffer area, i.e., an area of 10 km radius around the plant and mining sites.

The area is rich in species composition though the abundance and distribution is highly influenced by anthropogenic factors such as crop cultivation, grazing, charcoal production and wood cutting for domestic uses. A total of 241 floral species belonging to 79 families have been recorded in the buffer zone. Most of these species are indigenous while a few others are exotic or naturalized. A total of 23 cultivated plant species and 60 medicinal plants were recorded in the buffer area. The plant species encountered include 15 endemic species of which 5 are highly endangered (and 10 are of least concern) as per Ethiopian statutes. However, none of these were found in the core areas.

4.7.2 Fauna

Few fauna were observed in the core and buffer zones, as the area is highly impacted by deforestation and wildlife hunting. The fauna recorded in the buffer area include monkeys, baboons, hyenas, jackals, bush pig, serval, etc. There are no faunal species recorded from the Muger valley area that can be categorized as endangered, threatened or vulnerable. The species encountered are common forms that are observed in other parts of Ethiopia.

4.8 CULTURAL, HISTORICAL & ARCHAEOLOGICAL FEATURES

No visible archaeological remains, which have scientific, cultural, public, economic, ethnic and historic significances, have been observed in the area. The risk value of both the plant and the mining sites is very low, where no significant observable archaeological evidence is found. The sites have no archaeological importance. However, a Chance Find protocol will nevertheless be prepared to cover any unexpected finds.

4.9 SOCIO-ECONOMIC SCENARIO OF THE AREA

A detailed socio-economic survey has been carried out in the 10 km area around the project site. The poverty profile of the area is given below.

4.9.1 Income/ Consumption Dimension of Poverty

Consumption/ Expenditure

The results of the household survey carried out for the project area comprising of plant and mining areas reveal that the per capita consumption/ expenditure of the household and the population in the project area is estimated to be Birr 9214.37 and Birr 1722.77 respectively. According to the 2002 Development and Poverty Profile of Ethiopia the real per capita consumption expenditure of North and West Shoa zone, the area where the project is located, amounts to Birr 1087.2. The higher figure arrived at during the primary survey may partly be attributed to the time gap and current prices used in the calculation of the data.

In accordance with the 2002 Development and Poverty Profile of Ethiopia, the proportion of people in absolute poverty is about 31.7% in North and West Shoa Zones. This is by far better than the National and Oromiya Region absolute poverty figures of 39.9% and 44.2% respectively.

As indicated by the survey a significant portion of the expenditure incurred by people in the area is incurred on food. Food on average accounts for 56.4% of the household budget. Within the non-food category, clothing and house maintenance account for greater share of total expenditure (10.5 and 8.7%). Medical care and education budget contribute 4% and 0.8 % of the total household budget respectively.

Income

The major source of employment and income in the project area is mixed farming, i.e. crop production and livestock. Apart from the heads of the households who are often the breadwinners of the family, other family members also contribute to family income through employment in farming and off-farm activities.

The most important part of the income accounting to over 88.5% originates from agricultural and related activities mainly from the production of cereals and vegetables, perennial crops, domestic animals and its products, agro-forestry products and renting of farming lands. The remaining activities, i.e., trading, employment, handicrafts and others bring in the remaining income of the people. On the bases of the survey result, the annual per capita income of the households and population is computed to be Birr 10,287.62 and Birr 1923.4 respectively.

4.9.2 Non-Income/ Consumption Dimension of Poverty

Demography

The Plant and Mining sites are located close to Becho Dibdibe and Gimbichu villages within Becho Kidane Mehret and Anda Weizero Peasant Associations (PAs) respectively. The demographic details of the three PAs, viz., Becho Kidane Mehret (Plant area), Anda Weizero (Mining area) and Derba Gulele Beresa (the closest habitation of Derba) are given below:

Sn	PA	Population			Number of Households			Avg. Family Size	Population Density (persons/sq km)
		Male	Female	Total	Male	Female	Total		
1	Becho Kidane Mehret	804	872	1676	269	18	287	5.8	31.59
2	Anda Weizero	891	1611	2502	514	235	749	3.3	33.62
3	Derba Gulele Beresa	1825	2065	3890	1161	107	1268	3.1	147.46

The average population density is 70.9 persons/ sq km, which is, more than the national average of 50 persons/ km².

Females constitute 51.3% of the total population. Out of the total surveyed household heads (244) only 12.3% were female-headed households. The average family size in the project area is about 5.3. This is classified as a large family size, which usually indicates the characteristics of a poor family.

Residents of the project area are predominantly followers of the Orthodox Christian Religion (98.4%). The population of the project affected area is almost entirely of the Oromo ethnic group (97.5%) and Oromiffa is the major language spoken in the area. The Local Consultation is therefore carried out verbally and in Oromiffa language. The remaining 2.5% of the total households belong to Amhara ethnic group. None of the Project Affected Persons belong to ethnic minority groups.

Education

According to findings of the socio-economic survey, the overall literacy rate in the project area is very low. 81.5% of the surveyed household heads are illiterate whereas the remaining 18.5% are literate. Of this, less than a quarter of the household heads had formal education of which the majority was only till primary level.

Literacy rates are also disproportionate between sexes. While 88.5% of females are illiterate, the figure is 69.8% for males. Literacy rates are consistently higher for men than women throughout all levels of education.

Of the total household heads in the project area, 3.5%, 4.0%, 7.6%, and 1.5% and 1.5% have attained Lower Primary (1-4), Primary (5-8), and Secondary (9-10), Technical school and above grade 10 level education respectively.

Farm Assets

The main source of livelihood in the project area is agriculture. Therefore, land ownership in the project area becomes an important determinant of welfare. The major crops of the area are teff, barley, maize, sorghum, chickpeas, wheat, etc. Trees grown include banana, orange, mango, coffee, chat and eucalyptus tree is the dominant tree species. The area is mainly cultivated by means of traditional rainfed subsistence farming.

According to the survey results, average landholding of the surveyed household is found to be 2.8 ha. The majority, nearly 90.9% of the surveyed households own more than 2 ha of land. In general the size of individual land holding of the farmers in the study area is better than the average holdings on Regional and country levels. Thus farmers in the study area are likely to have better welfare status.

5. PROJECT ALTERNATIVES

Prior to arriving at a decision regarding establishment of a greenfield cement plant at Derba, different project alternatives were examined and reviewed. The options considered were:

- ❑ No project option
- ❑ Establishment of a new cement plant close to the quarry for production of cement.

Three possible plant locations have been considered.

Option 1 (Mugher, in the valley): This option would entail minimal transportation for limestone. However, other materials like pumice, coal, clay, which are available at a higher altitude, will have to be brought down to the valley. There is no road at present linking the heights to the valley area. Thus, a new 14 km long road shall have to be built. In addition transportation of cement also shall be difficult. Moreover, contiguous adequate flat land to the tune of 125 ha for location of plant is not available in the valley, and dispersion of kiln emissions will be difficult considering the elevation difference between the valley and the plateau.

Option 2 (Derba): This village has a good road connection. However, locating the plant close to habitation of Derba village is not advisable since it may lead to detrimental impacts on the local population.

Option 3 (8 km from Derba): The plant site can be connected to the mining area by a 7 km long conveyor. The flat area available is suitable for locating the plant with a residential complex. The site is also far from Derba village.

Thus Option 3 i.e. location of plant about 8 km from Derba has been selected to allow for minimal site disturbance and to avoid a site close to habitation.

The proposed new project works out to be economically viable, socially beneficial and environment friendly. The existence of abundant raw materials for cement production close to the proposed plant site, and the area being far away from habitation are the factors in favour of the selection of the proposed location at Derba.

6. POTENTIAL IMPACTS & MITIGATION MEASURES

The Operation phase of the proposed cement plant mainly comprises of the following activities:

- ❑ Excavation of limestone from the captive mines
- ❑ Transportation of crushed limestone from mines to plant site
- ❑ Transportation of other correctives/ additives to the plant site
- ❑ Preparation of raw meal by adding correctives to limestone
- ❑ Clinkerisation of raw meal
- ❑ Cooling and heat recovery
- ❑ Blending & grinding of clinker by adding additives
- ❑ Packing & Despatch

The details of main activities and actions to be undertaken and their impacts during operation phase of plant and mines are summarized below. Similar summaries have been prepared for the construction stage and plant closure stage.

Sn	Component	Activities	Potential Impacts
1	Transportation of raw materials and products	<input type="checkbox"/> Increase in traffic movement <input type="checkbox"/> Washing and maintenance of vehicles	<input type="checkbox"/> Disturbance to community & its safety <input type="checkbox"/> Contribution of dust and gaseous pollutants like SO ₂ , NO _x , CO, VOC to ambient air quality <input type="checkbox"/> Contribution to ambient noise level <input type="checkbox"/> Disposal of solid waste & waste water
2	Operation of plant / mines	Mines <input type="checkbox"/> Drilling <input type="checkbox"/> Blasting <input type="checkbox"/> Loading & transportation <input type="checkbox"/> Operation of mining machinery Plant <input type="checkbox"/> Crushing of limestone/ other raw materials <input type="checkbox"/> Preparation of raw meal <input type="checkbox"/> Clinkerisation of raw meal <input type="checkbox"/> Cooling and heat recovery <input type="checkbox"/> Blending & grinding of clinker <input type="checkbox"/> Packing & Dispatch	<input type="checkbox"/> Air emissions from operations are Dust, NO _x , SO ₂ , GHG and unburnt hydrocarbons. <input type="checkbox"/> Generation of noise and vibrations from blasting <input type="checkbox"/> Waste water generation from: <ul style="list-style-type: none"> o Water treatment plant o Domestic usages in plant <input type="checkbox"/> Solid waste from wastewater treatment plant as dry sludge, waste lubricating oil from machinery and municipal waste from domestic usages <input type="checkbox"/> Accidental spillage of oil, if any.
3	Socio-economic	<input type="checkbox"/> Acquisition of land <input type="checkbox"/> Payment of taxes and royalty <input type="checkbox"/> Direct and indirect employment <input type="checkbox"/> Development of infrastructure like roads, medical, transportation, etc <input type="checkbox"/> Implementation of Welfare schemes <input type="checkbox"/> Demand of local products and agricultural products <input type="checkbox"/> Development of green belt	<input type="checkbox"/> Loss of agricultural land <input type="checkbox"/> Loss of grazing area <input type="checkbox"/> Employment to locals <input type="checkbox"/> Business opportunities to locals <input type="checkbox"/> Increase in per capita income <input type="checkbox"/> Increase in literacy rate <input type="checkbox"/> Change in living standard <input type="checkbox"/> Regional development <input type="checkbox"/> Saving of foreign exchange

6.1 QUALITATIVE IMPACT ASSESSMENT

The details of criteria adopted for impact assessment are as follows:

Impact Rating		Criteria		
Nature of impact	Beneficial	Positive		
	Adverse	Negative		
Duration of impact	Short term	Impacts shall be confined to a stipulated time		
	Long term	Impacts shall continue till the end of plant life		
Likelihood of occurrence	Negligible	<10%	Low	10-40%
	Medium	40-60%	High	60-80%
	Very high	80-100%		
Significance of impact	Minor	Noticeable impacts only		
	Localized	Noticed by adjacent locality & may have direct impacts		
	Major	Have direct sustainable impacts		
	Massive	Ability to change the system		
Potential impact level	Low	Has practically no impact		
	Medium	Has impact in local area		
	High	Has impact in region		

The qualitative impacts of the proposed project during construction and operation phases are summarized here.

Particulars	Impact Rating				
	Nature	Duration	Likelihood	Severity	Potential
Construction Phase					
Land Use	Adverse	Long term	Medium	Localized	High
Air Quality	Adverse	Short term	Medium	Localized	Medium
Noise level	Adverse	Short term	Medium	Localized	Medium
Water Resources	Adverse	Short term	Medium	Localized	Medium
Waste Water	Adverse	Short term	Medium	Localized	Medium
Soil & Solid Waste	Adverse	Short term	Medium	Localized	Medium
Ecology	Adverse	Short term	Medium	Localized	Medium
Socio-economic & employment	Beneficial	Short term	Medium	Localized	High
Operation Phase					
Green House Gas Emission	Adverse	Long term	High	Regional	Medium
Air Quality	Adverse	Long term	Medium	Localized	Medium
Noise level	Adverse	Long term	Medium	Localized	Medium
Traffic movement	Adverse	Long term	High	Localized	Medium
Water Resources	Adverse	Long term	Medium	Localized	Medium
Waste Water	Adverse	Long term	Medium	Localized	Low
Solid Waste	Adverse	Long term	Medium	Localized	Low
Ecology	Adverse	Long term	Medium	Localized	Low
Loss of agricultural/ grazing land	Adverse	Long term	High	Localized	High
Employment & Economic growth	Beneficial	Long term	High	Regional	High
Socio-economic Measures	Beneficial	Long term	High	Localized	High

6.2 MITIGATION MEASURES

The mitigation measures for the identified impacts are described below.

Sn	Potential Impact	Main Source of Risk	Mitigation Measures
1	Natural Resources	Depletion of Limestone reserves and other corrective materials and additives	<ul style="list-style-type: none"> <input type="checkbox"/> Availability of raw materials shall be estimated properly <input type="checkbox"/> Regular review of raw mix to get consistent quality of products <input type="checkbox"/> Continuous attempt to control wastages during transportation, storage and handling of raw materials <input type="checkbox"/> Mining plan will be prepared to optimize the mining methodology and ensure the implementation of a progressive reclamation plan to replant in areas where limestone has been excavated <input type="checkbox"/> Regular monitoring of availability of stocks and consumption of raw materials, dispatch of products and loss of material
2	Air Emissions		
A	Emission from mines	<ul style="list-style-type: none"> o Drilling o Blasting o Loading and unloading o Crusher o Transportation o Wind erosion o Traffic movement 	<ul style="list-style-type: none"> <input type="checkbox"/> Dust emissions from crusher will be controlled by bag filter. <input type="checkbox"/> All dumps will be suitably vegetated. <input type="checkbox"/> A speed limit will be defined for the trucks/ dumpers moving within the mining area. <input type="checkbox"/> Dust suppression systems (water spraying) will be adopted at faces/ sites before and after blasting and while loading <input type="checkbox"/> Dust generated due to blast hole drilling will be suppressed by using water injecting system of dust collectors in the drills. <input type="checkbox"/> Use of sharp drill bits for drilling holes and drills with water flushing systems (wet drilling) to reduce dust generation, <input type="checkbox"/> Use of sharp teeth for shovels to reduce dust generation, <input type="checkbox"/> Regular water spraying will be carried out on haulage roads by water sprinklers during transportation of raw materials <input type="checkbox"/> All vehicles and their exhausts will be well maintained and regularly tested for emission concentration.

Sn	Potential Impact	Main Source of Risk	Mitigation Measures
			<ul style="list-style-type: none"> <input type="checkbox"/> Dust masks will be provided to workers engaged at dust generation points like drills, loading, unloading points, etc. <input type="checkbox"/> Extensive plantation will be carried out in and around the mining area <input type="checkbox"/> Use of good quality explosives having proper oxygen balance with regular monitoring.
B	Air emissions from stacks	Air Emissions <ul style="list-style-type: none"> o Crusher o Raw Mill o Coal Mill o Kiln o Clinker Cooler o Cement Mill o Packing Plant o DG sets o Traffic movement 	<ul style="list-style-type: none"> <input type="checkbox"/> Ensure maximum efficiency of combustion in kiln and emergency DG sets <input type="checkbox"/> Suitably designed ESPs/ Bag filters will limit the dust concentration to 25 mg/ Nm³ in all emissions <input type="checkbox"/> In the event of failure of any pollution control equipment, automatic tripping in the control system will be provided <input type="checkbox"/> For ESP operations, any disturbance in the power supply to electrode will switch the whole unit off <input type="checkbox"/> Efficiency of each air pollution control equipment will be ensured to more than 99% <input type="checkbox"/> SO₂ and NOx emissions will be within the norms of 400 mg/ Nm³ and 600 mg/ Nm³ respectively as specified by IFC. <input type="checkbox"/> A well-designed burner system will limit the core flame temperature to ensure a low value of NOx <input type="checkbox"/> Impact of CO emission will be negligible in view of the firing technique of keeping a positive oxygen balance. <input type="checkbox"/> Regular preventive maintenance of pollution control equipment <input type="checkbox"/> All vehicles and their exhausts will be well maintained and regularly tested for emission concentration. <input type="checkbox"/> Continuous dust monitor will be installed on all point emissions <input type="checkbox"/> Continuous SO₂ and NOx monitor will be installed on main stack
C	Fugitive Emissions	<ul style="list-style-type: none"> <input type="checkbox"/> Storage and Conveying/ transportation of raw materials and products <input type="checkbox"/> Leakages from machinery and pipes 	<ul style="list-style-type: none"> <input type="checkbox"/> Jet Pulse bag filters will be provided at all dry material conveying and transfer points <input type="checkbox"/> Drop distances will be minimized by the use of adjustable conveyors <input type="checkbox"/> Dust suppression system by water sprinkler at dump hopper of raw materials <input type="checkbox"/> Regular dust suppression with water sprinkler on the haul roads <input type="checkbox"/> Plant roads & approach roads will be made of bitumen/ concrete & mechanical vacuum cleaner shall be used for cleaning of dust on internal roads <input type="checkbox"/> Open areas within the plant premises/ along boundaries of the plant premises will be covered under green belt <input type="checkbox"/> Raw Materials/ products will be fully covered during transportation to/ from the site by road.
D	Green house Gas Emissions	<ul style="list-style-type: none"> <input type="checkbox"/> All stacks <input type="checkbox"/> Traffic movement 	<ul style="list-style-type: none"> <input type="checkbox"/> The proposal to manufacture blended cement shall reduce clinker requirement in cement, thereby reducing GHG emissions. <input type="checkbox"/> The state-of-the-art-technology of 5 stage preheater will lead to increased energy efficiency thereby reducing GHG emissions.

Sn	Potential Impact	Main Source of Risk	Mitigation Measures
3	Noise Emissions	<ul style="list-style-type: none"> <input type="checkbox"/> Operation of noise generating equipment like compressors, pumps, DG sets, etc. <input type="checkbox"/> Maintenance <input type="checkbox"/> Traffic movement <input type="checkbox"/> Procurement of drill, loaders and dumpers and other equipment with noise proof system in operator's cabin 	<ul style="list-style-type: none"> <input type="checkbox"/> Cumulative noise level at walkways and work areas will be <85 dB (A) and no worker will be exposed to a noise level >85 dB (A) without hearing protection <input type="checkbox"/> Noise level at the boundary of plant/ mines will be <70 dB (A) <input type="checkbox"/> Blasting operations will be carried out only during the day time using milliseconds detonators and cord relay so as to avoid high noise intensity <input type="checkbox"/> Regular maintenance of noise generating equipment <input type="checkbox"/> Provision of silencers will be made wherever possible. <input type="checkbox"/> Necessary enclosures will also be provided on the working platforms/areas for local protection in high noise level areas <input type="checkbox"/> Proper lubrication & housekeeping to avoid excessive noise <input type="checkbox"/> The operators will be provided with necessary safety and protection equipment such as ear plugs, ear muffs etc. <input type="checkbox"/> Provision of plantation in and around the plant premises
4	Ground Vibration/ Fly Rocks	<ul style="list-style-type: none"> <input type="checkbox"/> Drilling <input type="checkbox"/> Blasting 	<ul style="list-style-type: none"> <input type="checkbox"/> Careful planning, checking, execution & monitoring of each blast <input type="checkbox"/> Blast holes will always be initiated by short delay detonators rather than adopting instantaneous detonation. Short delay in blasting of successive blast holes effectively reduces the vibration problem. <input type="checkbox"/> Free faces will be sufficiently cleared of any loose material before blasting and burden. <input type="checkbox"/> Multi row blasting will be followed. <input type="checkbox"/> Use of ANFO, which has low velocity of detonation, shall also reduce the vibration problem.
5	Ground Water Resources	<ul style="list-style-type: none"> <input type="checkbox"/> Make up water for cooling <input type="checkbox"/> Dust suppression <input type="checkbox"/> Domestic 	<ul style="list-style-type: none"> <input type="checkbox"/> Continuous attempt will be made to optimize/reduce the use of water <input type="checkbox"/> Water harvesting will be carried out to the maximum extent possible <input type="checkbox"/> Regular monitoring of ground water table
6	Waste Water	<ul style="list-style-type: none"> <input type="checkbox"/> Domestic <input type="checkbox"/> RO Rejects 	<ul style="list-style-type: none"> <input type="checkbox"/> STP with tertiary treatment will be provided and no waste water shall be discharged from the plant premises <input type="checkbox"/> Treated effluent will be used for dust suppression and plantation/ greenbelt development <input type="checkbox"/> Rejects from RO of STP will be sprayed on raw material stockpiles and coal stored in yard. <input type="checkbox"/> Construction of suitably designed drains all along the roads and boundary of the plant premises <input type="checkbox"/> Appropriate storm water and runoff control systems will be provided to minimize the quantities of suspended material carried off site
7	Solid waste (hazardous & non-hazardous)	<ul style="list-style-type: none"> <input type="checkbox"/> Maintenance and Operation of integrated plant <input type="checkbox"/> Storage and handling of fuel <input type="checkbox"/> Accidental spillage 	<ul style="list-style-type: none"> <input type="checkbox"/> Whenever possible, use of non-hazardous instead of hazardous materials. <input type="checkbox"/> All hazardous (ignitable, reactive, flammable, corrosive, and toxic) materials will be stored in clearly labeled containers or vessels <input type="checkbox"/> All hazardous wastes, process residues, solvents, oils, and sludges will be properly disposed of <input type="checkbox"/> Recycle or reclaim materials where possible <input type="checkbox"/> If recycling or reclamation is not practical, wastes will be disposed of in an environmentally acceptable manner and in compliance with local laws and regulations. <input type="checkbox"/> Careful garbage transportation to dumping site and disinfections of transport vehicles body <input type="checkbox"/> Fire prevention systems and secondary containment will be provided for storage facilities, to prevent fires or the release of hazardous materials to the environment

Sn	Potential Impact	Main Source of Risk	Mitigation Measures
8	Spill Management	<ul style="list-style-type: none"> <input type="checkbox"/> Maintenance and Operation <input type="checkbox"/> Storage and handling of fuel <input type="checkbox"/> Accidental spillage 	<ul style="list-style-type: none"> <input type="checkbox"/> Impervious liners in place for fuel, lubricants and chemicals storage area. <input type="checkbox"/> Effective bunds capable of containing 110% of the volume within and enclosing all potentially contaminating materials to be used for fuel and lubricants storage area <input type="checkbox"/> Oil drip pans will be used wherever there is significant potential for leakage including, but not limited to; <ul style="list-style-type: none"> o Electric generator engine o Compressors, pumps or other motors o Maintenance areas o Fuel transfer areas
9	Occupational Health & Safety	<ul style="list-style-type: none"> <input type="checkbox"/> All Operations 	<ul style="list-style-type: none"> <input type="checkbox"/> Provision of PPE like ear muffs, helmets, boots, dust masks, etc. to employees <input type="checkbox"/> Safe procedure for storage and handling the explosives will be developed <input type="checkbox"/> Adequate training will be provided to the staff <input type="checkbox"/> Regular medical check up of workers

6.3 SOCIO-ECONOMIC DEVELOPMENT PLAN

DMC will actively contribute to improve the socio-economic conditions of the area. The details of the Socio-economic Development Plan are given below:

6.3.1 Community Development Fund

DMC is committing an annual contribution of Birr 250,000 per year for establishing a revolving fund to support/ supplement the efforts to help finance small scale businesses for the local communities. A Committee comprising of officials from Sululta Wereda, PAs, and DMC will oversee the implementation of the fund. DMC shall continue the contribution till the cumulative contribution reaches Birr 2.5 million.

6.3.2 Employment and Business Opportunities

Preference is being/ will be given in employment to able-bodied locals whose land has been permanently acquired for the project. Currently 70 local labour have been employed at the project. As the construction progresses, the local labour proposed to be employed shall be around 400. The Community Development Fund which will be established by DMC will help the interested locals in setting up small businesses like transportation, auto workshops, eateries, and other small shops which shall come up to cater to the cement plant and the “transport sector” visiting the plant.

6.3.3 Road Development

Major road building and upgradation is proposed by DMC in the area.

Road from the Plant to mines will for the first time link the valley to Derba and further. The proposed bridge over Mughher river will provide an access to the villages in the vicinity of the quarry and beyond. The road from Chancho to Derba, which is presently a gravel road, will be converted to a tarred black-topped road in stages, which will provide a better connectivity. There are presently four old, narrow bridges over small streams on the way from Chancho to plant site. New bridges will be constructed alongside these bridges thereby providing much improved infrastructure in the area. A new, tarred road will be constructed from Derba to the plant site.

6.3.4 Health Facilities

A Health Centre staffed by a Doctor, a Nurse, Laboratory technician, pharmacist and other supporting staff will be set up within the plant which will serve the employees of DMC.

DMC plans to extend health facilities for the local community by establishing a Clinic for inhabitants around the plant site. The ownership and administration of the Clinic shall be with the Regional Government. The estimated cost of the Clinic, which will be allocated by DMC in its budget, is:

Establishment Cost	:	Birr 300,000
Health facility Cost	:	Birr 200,000
Total	:	Birr 500,000

DMC is willing to support the upgradation and upkeep of the established Centre by providing the Centre up to Birr 10,000 per month aimed at supplementing the running expenses, manpower expenses, etc. In addition to the above, professional assistance to organize and run the Centre will be provided by DMC health professionals.

The health facility at quarry site will also be established to the same standards as the plant facility. The cost of health facility, which will be borne by DMC, is estimated as Birr 200,000. However, the administration and management of the health facilities will remain with the concerned office of the Regional Government. A financial assistance of Birr 10,000 per month will be given for supplementing the running expenses of the Health Centre.

DMC health professionals will extend close cooperation and help in periodic health surveys and during occurrence of any accidents, calamities, etc.

Diseases of high concern during the construction phase due to labour mobility are sexually transmitted diseases (STDs) such as HIV/ AIDS. DMC propose the following measures:

- ❑ Undertaking health awareness and education initiatives by imparting information and counseling to influence individual behaviour as well as promote individual protection, and protect others from infection.
- ❑ Training health workers in disease treatment
- ❑ DMC shall ensure ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers

A number of measures are proposed to reduce the impact of vector-borne diseases like malaria in the workers and the local communities.

Sanitation in and around the project area will be improved to eliminate breeding habitats. Use of repellants, clothing, netting, etc. will be promoted. DMC will make efforts to provide appropriate drugs to workers and collaborate with public health officials to help eradicate disease reservoirs. It is proposed to monitor and treat the migrating population to prevent disease spread and also educate project personnel and area residents on risks, prevention, and available treatment.

Education

DMC commits to build new or expand the existing elementary school at the plant and quarry sites and hand over the same to the concerned Government office for managing them. DMC is allocating in its budget for expanding and upgrading the educational facilities at Derba town and quarry. The estimated costs are:

Cost of additional classrooms at plant site and quarry	:	Birr 500,000
Cost of facilities like desks, laboratory equipment, etc.	:	Birr 250,000
Total	:	Birr 750,000

A Regional Vocational Training Center is proposed to be established by Sululta Wereda at Chancho. DMC will contribute about Birr 224,000 for the establishment of Vocational (Health Extension Workers and Farmers' Training) Centre.

Water Supply

DMC will help in improving the water supply in the area. As observed during the socio-economic baseline survey, almost all villages rely on dirty, non potable stream water for their water requirement. This has lead to prevalence of water borne diseases.

Water supply access will be extended to a total of seven villages around the plant and mining sites. These villages are Adero, Abale, Becho Kidanemehrat, Debedebe, Muger, Anda Wezero and Anda Botero. The amount of water, which shall be made available, is estimated to be 83,560 litres per day (assuming consumption of 20 l/ day) in the form of one water point per village. The water points shall be run by a Water Committee, which shall be established comprising of members of the community. The community will be expected to generate a small amount of revenue from the sale of water, so as to cover at least the maintenance cost of the system.

Communication

With the establishment of the plant, DMC will set up modern communication facilities like telephones, internet, etc. in the area, which will also be available to the local population.

Electricity

DMC will extend up to 2MW electric power line for the community along the Derba-plant road and around the plant site to facilitate personal connections for the community. However, the cost of individual connections and bills based on the consumption will be borne by the individuals.

6.4 AUDITS AND MONITORING

Environmental monitoring and audits will be undertaken during & after the construction and development phase and during operation phase to check that the environmental management measures are being satisfactorily implemented and that they are delivering the appropriate level of environmental performance. A summary of the proposed monitoring plan is given below.

Impact	Monitoring method	Parameters	Location	Frequency
Air quality	Measurement/ sampling	PM/ PM ₁₀ , NO _x , SO _x	Pyro-processing stacks	Continuous
		PM/ PM ₁₀	Cement grinding and clinker cooler stacks	Continuous
		PM/ PM ₁₀ , CO ₂ , Temperature, Oxygen level, combustion efficiency	Combustion sources	Biannually
		Ambient PM/ PM ₁₀ , NO _x and SO _x	Selected receptor villages, colony, plant premises	Quarterly
Noise	Measurement	Leq (dB(A))	Mines, Crusher, Raw mill, Cement Mill	Biannually
			Four (4) sites around Plant site	Biannually and upon complaints
Surface and ground water	Sampling	Temperature, pH, Oil content, Suspended solids, COD	Ground water wells, installed grease traps, oil/ water separators, sedimentation tanks	Quarterly
Soil	Sampling	Moisture content, pH, salinity, Nitrogen, Phosphate, Chloride, Potassium, Sodium	Agricultural plots near project site	Annual
		Heavy metal content (mercury, lead, chromium, copper, nickel, zinc and cadmium)		Every three years
Solid Waste	Audits, photographic documentation, and interviews	Generation, storage, recycling, transport and disposal	Plant premises	Quarterly
Biodiversity	Visual inspection and photographic documentation	General condition of the floral cover	Plant, mines and landscaped areas	Annual
Resource use	Metering	Water and energy consumption	Plant and mines	Continuously
	Audit	Raw material consumption	Plant and mines	Continuously
Health and Safety	Health and safety surveys	Proper use of PPE, presence of safety signs, first aid kit, fire fighting devices, Injury/ illness records. Accident statistics	Plant, road linking plant to Derba	Continuously

Impact	Monitoring method	Parameters	Location	Frequency
		recording in accordance with ILO standards, including recording of Lost-Day-Accidents per Million-man hours (LDA/MMH)		
Socio-economic	Field questionnaire	Local population	Plant and surrounding areas	Annually
	Interviews	Employment records	Plant	Continuously
Operations monitoring	Visual inspection and documentation	Production rate, gas flow rates, counter readings, pressure valves, temperatures, abnormal readings, overloads, stoppages	All facilities and major equipment at Plant and Mines	Daily

The Federal EPA has no capacity for monitoring or environmental auditing. DMC will have a dedicated Environmental Management Cell within the plant to oversee environmental management of its operations. Like the EPA, the Government institutions like Wereda level offices at Chancho and PAs do not have the capacity to undertake or assist in implementing social development schemes in the area on behalf of DMC. Thus the Environmental Management Cell will have a strong Social set up to take care of the social development plans in the surrounding area. A Grievance Cell will also be established to address the complaints/grievances of the local communities.

7. PUBLIC CONSULTATION

Public consultation plays a key role in enabling the public to participate in the planning of project that affects the people directly. The project is proposed to be located within Oromiya Regional State of the country. There are five Weredas located within and around the project. There are twenty eight (28) Kebeles or Peasant Associations that are organized under the Weredas consisting of a number of settlement villages. The Kebele Peasant Association (PA) is the lowest governmental administrative unit of the rural area.

The consultative participants from administrative and community levels total to 1,247 consisting of 40 Wereda officials, 28 Kebele Peasant Associations council members, 223 community members consulted through community discussions and 956 individual household heads consulted privately.

The major issues identified and the suggestions proposed during the Public Consultation include:

- Contain smoke, dust, noise, hazardous discharge and minimize environmental pollution;
- Extend health services to the local residents by constructing hospital or health center;
- Create awareness among the people to combat the spread of HIV/AIDS and other STDs and provide treatment for patients;
- Provide appropriate compensation for the People to be evicted from their land. In addition, project should seek ways and means of restoring their livelihood;
- Create awareness among the people to benefit from project related activities such as trading, etc.;
- Develop infrastructure, school, electricity, telecommunications, hospital and the like for the community;
- Jointly seek remedial measures to regulate the unemployment rate in the project area;
- Assist the creation and operation of small and micro institutions;
- Launch reforestation program near the project site and the quarry;
- Community level discussion should continue to jointly identify and recommend corrective measures for the potential problems.

8. RESETTLEMENT PLAN

The Cement project comprises of the following sections, which necessitate acquisition of land:

- ❑ Plant area
- ❑ Mining area
- ❑ Road from Derba to plant site
- ❑ Road from Plant to Mines
- ❑ Road from Chancho to Derba
- ❑ Right of way for disturbances caused by power line, water pipeline and conveyor belt

As per the statutes of FDRE, DMC is required to pay lease rent for the land for the project, which is acquired by the Oromiya Regional Government. DMC is paying the Compensation for acquisition of this land, which is on account payment for the lease rent. The acquisition of the total plant area (125 ha), road from Derba to plant (4.83 ha), road from Chancho to plant (8.2 ha), land for water supply (4.35 ha) is already complete. Land acquisition for conveyor belt, mining area, power transmission line and road from plant to mines is under progress.

A total compensation of Birr 13,330,736.80 has been paid to 354 landowners who have lost part of their landholdings and 74 house owners who have lost their houses. The details of the compensation paid are summarized below:

Purpose	Site/ Village	Land owners who have lost total land			Landowners who have lost part of their land			Land owners who have lost houses			Total Compensation paid (Birr)	Whether acquisition completed or in progress
		Nos.	Total area (ha)	Compensation paid (Birr)	Nos.	Total area (ha)	Compensation paid (Birr)	Nos.	Total area (ha)	Compensation paid (Birr)		
Plant site												
	Becho Kidanemeheret	-	-	-	94	125.104	4,466,034.36				4,466,034.36	Completed
Road from Derba to Plant												
	Derba Gulele Berisa PA	-	-	-	37	4.83	349,143.60				349,143.60	Completed
Due to Quarry site												
	Becho Kidanemeheret	-	-	-	4	0.75	41,607.00				41,607.00	Completed
Road from Plant to Mines												
	Ada Gimbichu	-	-	-	116	139.70	5,186,497.10	78		1,229,898.50	6,416,395.60	In progress
	Becho Kidanemeheret				88	23.07	1,305,187.60				1,305,187.60	Completed
Road from Chancho to Plant site												
	Derba Gulele Berisa PA				50	7.86	479,931.80				479,931.80	Completed
	Becho K.meheret (Dibdebe)				2	0.34	18,722.00				18,722.00	Completed
Road for Water supply												
	Lilo-Chebeka				4	2.50	33,819.60				33,819.60	Completed
	Amara Sefer				12	1.85	12,595.35				12,595.35	Completed
Conveyor Belt/Right of way In progress												
Mining Area												
	Anda Wiezero				32	6.21	201,200.70				201,200.70	In progress
	Anda Wiezero				9	0.83	6,099.19				6,099.19	In progress
Power Transmission Line In progress												
				Total	354	187.942	12,100,838.30			1,229,898.50	13,330,736.80	13,330,736.80

9. CONCLUSIONS

The proposed cement project will impact on the physical, natural and socio-economic environments at Derba. The plant and mining operations will result in permanent changes in the land use of the area. Agricultural and grazing land will be converted to industrial and mining. However, the soil quality of the area will remain unchanged.

Air emissions from the plant will be highly controlled and the installation of state of the art pollution equipment will limit the dust and gaseous pollutants levels much below the norms specified by the IFC to ensure a continued good air quality in the area.

The proposed plant and mines will not affect the hydrology of the region. The drainage pattern will not be affected and the quality of the water will also not be affected by the mining operations. The vegetation in the mining area may be disturbed, causing a loss of crops, fruit trees and natural vegetation. However, the flora and fauna existing in the area are of common species. Mitigation measures including a rehabilitation and management program and a green belt/ afforestation plan will reduce the overall ecological impacts and in the long term improve the forest cover to the benefit of the fauna diversity.

Employment resulting from plant and mining operations and associated services and improved infrastructure and facilities in the area will be the main socio-economic benefits for the affected community. The acquisition of land in the plant and mining area and the access roads and the resettlement of people living in these areas are the major negative impacts of the project. The implementation of the resettlement action plan will mitigate these impacts in terms of compensation and improvement of livelihood of the affected families.