RWANDA STONES & CONSTRUCTION (RSC) Ltd Co

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT FOR

A STONE CRUSHING FACTORY

August 2011

Contents

1.0 EXECUTIVE SUMMARY

The article 67 of the Organic Law N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda stipulates that every development project shall be required to undergo Environmental Impact Assessment prior to its commencement.

Furthermore the Ministerial order No. 004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undertake an environmental impact assessment lists construction of industries, factories and activities carried out in those industries .

It this regards that RWANDA STONES & CONSTRUCTION (RSC) Ltd Co hired the consultancy firm, Green World Consult, to carry out the present Environmental Impact Assessment.

The identification of the impacts of the project on the environment showed that during the operation, there will be no negative impact on environment as it is a stone crushing factory which does not use any chemicals. The stones are dry and hence no effluent. The type of rock to be crushed is very hard black type with specialized equipment and therefore minimal emissions is expected to be released to the atmosphere. There will be an important number of positive impacts on the human environment such as availability of stone to supply the exponentially growing construction industry in Rwanda and East Africa at large, the improved employment opportunities to the population of the zone, the increase in the income of the population working on the site, the payment of taxes to the local and central government as well contributing then to the poverty reduction in the country in general.

The project will also have some marginal negative impacts especially during the crushing process such as production of dust emissions and noise pollution; on the socio-economical and biophysical environment such as the degradation of air quality by the dust emitted during the site clearing, effects of air pollution, risk of excess soil being eroded from the site where stones are manually extracted, Loss of habitat for some fauna and flora species and biodiversity reduction due to vegetation clearing neighbouring the stone extraction site.

Different mitigation measures for these negative impacts have been proposed to reduce to the minimum their effects on the socio-economical environment as well as on the biophysical environment.

Among the proposed mitigation measures are to use specialized equipment and have them serviced regularly so as to minimize noise and dust emissions, good site management system is proposed in order to minimize the risk of accidents during the process of crushing. An ecosan toilet to be installed to prevent pollution from human waste. In order to ensure that the proposed mitigation measures will be implemented, an environmental management plan has been developed to guide all activities of the project during all its phases concerning the protection of the environment. This plan specifies the nature of the negative impact, the proposed mitigation measures, the indicators in the execution of these mitigation measures, the time period, the responsibilities and the follow-up needed from concerned and specified parties. An emergency plan in case of accident was also developed.

Some negative impacts of this project can be eliminated, reduced or compensated if the proposed environmental management plan is followed as proposed. Additional to that some recommendations have been proposed so that the execution of the project becomes a success without harming or with the least negative effect to the environment in general.

2. INTRODUCTION

Stone crushing industry is an important industry sector in the country engaged in producing crushed stone of various sizes depending upon the requirement which act as raw material for various construction activities such as road construction, bridges, highways among others.

The stone crushing plant employs many people both skilled and unskilled who are involved in the entire process of mining, crushing and transportation of the crushed stone. The plant's ideal location is supposed to be near growing towns or cities so as to supply the demand for the stone and at the same time near the source to the stone to be crushed.

Rwanda Stones & Construction Ltd will produce and sell all types and grades of gravel to public and private customers based all over the country and mainly in Kigali City. The site of 8,719 square meters is called **"NYABIGUGU site"** and is located in Kicuciro district, Gahanga sector, Murinja cell.

This Study consists in assessing the Environmental Impacts for the project of crushing stone in the site mentioned above.

2.1. Author Presentation

This Report has been produced by Green World Consultants that was hired by the Project Promoter, Rwanda Stones & Construction Ltd Co, to carry out the study. The Consultancy firm is based in Rwanda and has got strong background and knowledge in the area of Environmental Assessment, and a track record of over 8 years for conducting studies of Environmental Impact Assessment for Development Projects in Africa in general and particularly in Rwanda.

2.2. Promoter Presentation

The Rwanda Stones and Construction Ltd Co. is owned by Mr. RATHOD RAYSANG GANDABHAI and Indian national who holds 50% of the capital and has an extensive experience in all phases of gravel and rock hauling , production and industrial practices who will oversee operations of the company. The second share holder is

Mr. HERMAN PURSOTTAMBAHAI also an Indian national who holds 50% of the capital educated in natural resources management and with customer service experience, shall be in charge of public accounts and day to day management.

2.3. Objectives of the study

Reducing the burden of environmental impacts is necessary if development is to become sustainable. As resources become limited, environmental impacts become more complex, EIA has become of ever increasing importance as a tool for development and decision making. This role is formally recognized in principle 17 of the Rio Declaration on Environment and Development (UNCED 1992).

"Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have significant adverse impact on the environment and are subject to a decision of a competent national authority".

In practice, EIA is applied primarily to prevent or minimize the adverse effects of major development projects. It is also used as a planning tool to promote sustainable development by integrating environmental considerations into a wide range of proposed actions. Most notably, the use of policies and plans to focus on the highest levels of decision making and take care of the environment in considering development alternatives and options. More limited forms of EIA can be used to ensure that smaller scale projects like the Rwanda Stone and Construction Co; conform to appropriate environmental standards or site and design criteria.

The aim and objective of EIA can be divided into two categories. The immediate aim of EIA is to inform the process of decision making by identifying the potentially significant environmental effects and risks of development projects. The ultimate (long term) aim of EIA is to promote sustainable development by ensuring that development projects do not undermine critical resource and ecological functions or the well being, lifestyle and livelihood of the communities and people who depend on them.

The main objective of this study consist in carrying out a comprehensive Environmental Impact Assessment study for the stone crushing project on the environment during the site preparation and operation phase.

The specific objectives of the study are the following:

- To detect the effects of the project on the neighbouring environment such as the water bodies, the soil, he people, the infrastructure, the fauna, the flora and the atmosphere;

- To detect the effect of the neighbouring environment on the project, this means the effect on the soil of the project and the surrounding activities;

- To detect the effect of the project on the environment;

- To propose alternative measures where it is noticed that adverse effect may occur;

- To enable the proposal mitigation measures where adverse effects may have occurred;

- To carry out a diagnosis of the existing environment and activities in the area of the project;

- To propose enforcement measures where beneficial effects from the project are detected;

- To set up an environmental management plan that will govern all activities of the project for the better protection of the environment.

2.4. Methodology used for the study

Based on terms of reference (ToR) prepared by the Green World consultant, the methodology used by the consultant consisted in the following:

a) Literature review: Documentation on policies, laws, regulations and guidelines related environmental management, industry sector, waste management, land use EIA process etc, at the national level as well as the international level have been done.

b) Interviews: The consultant has interviewed people in the area of the project as well as in the Ministries and other governmental institutions related to this project.

c) Data collection: Through site visit of the site, required qualitative and quantitative data have been collected

d) Stakeholders consultation: the consultant analyzed key partners/stakeholders including REMA, Kicuciro District, Muhanga District the Private Sector Federation, neighbouring communities etc, to find out their involvement, role and responsibilities in this project.

e) Mapping and zoning of the site

f) Reporting: the data and information collected were organized and compiled in a report.

3. LEGISLATIVE AND REGULATORY CONSIDERATIONS

3.1. Legislative and policy framework for environmental impact assessment (EIA) in Rwanda

3.1.1. The Constitution of the Republic of Rwanda

In consideration of the Constitution of the Republic of Rwanda of June 4, 2003 as amended to date, the articles 49 states that every citizen is entitled to a healthy and satisfying environment. Every person has the duty to protect, safeguard and promote the environment. The state shall protect the environment. The law determines the modalities for protecting, safeguarding and promoting the environment.

3.1.2. Rwanda Vision 2020

The vision 2020 of Rwanda gives as strategic actions inter alia institute the principle of precaution to mitigate the negative effects caused to the environment by the socioeconomic activities, to institute the "polluter pays" principle as well as preventive and penal measures to ensure the safeguard of the environment and to require the environmental impact study of any development project.

3.1.3. Economic Development and Poverty Reduction Strategy (EDPRS)

Rwanda's Economic Development and Poverty Reduction Strategy (EDPRS) is a medium-term framework for achieving the country's long term development aspirations as embodied in Rwanda Vision 2020, the seven year Government of Rwanda (GoR) programme, and the Millennium Development Goals (MDG).

The strategy builds on strong achievements in human capital development and promotes three flagship programmes. These flagships serve as a device to prioritize actions by the GoR, mobilize resources for development and improve policy implementation through more coordinated interventions across sectors.

In the EDPRS, environmental and land priorities involve ecosystems rehabilitation of degraded areas and strengthening newly established central and decentralized institutions. Special attention will be paid to sustainable land tenure security through land registration and rational land use planning and management, soil and water

conservation, reforestation, preservation of biological diversity and adaptation and mitigation against impacts of climate change. The water and sanitation sector aims to ensure sustainable and integrated water resources management and development for multipurpose use including increased access for all to safe water and sanitation services.

3.1.4. The National Environmental Policy

The National Policy of Environment adopted by the Cabinet in November 2003 has an overall objective to the improvement of human well-being, the judicious utilization of natural resources and the protection and rational management of ecosystems for a sustainable development.

The option of the policy on population and land-use management is to balance the national policy in terms of population, land-use management and environment, while the policy option on Land is to ensure that land, which is the major resource of the country, is not degraded and used in an unplanned manner.

3.1.5. The National Environmental Law

The Chapter IV of the Title III of the Organic Law n° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda regulates the Environmental Impact Assessments.

In its article 67: Every project shall be subjected to environmental impact assessment, before obtaining authorization for its implementation. This applies to programmes and policies that may affect the environment. An order of the Minister having environment in his or her attributions shall determine the list of projects mentioned in this organic law.

The article 68 specifies the main points that an Environmental Impact Assessment must include.

The article 69 stipulates that the environmental impact assessment shall be examined and approved by the Rwanda Environmental Management Authority or any other person given a written authorization by the Authority. The promoter pays a levy reduced from the operating cost of his or her project excluding the working capital. This tax is determined by the law establishing the National Fund for the

Environment. The environment impact assessment shall be carried out at the expense of the promoter.

The article 70 states that an order of the Minister having environment in his attributions establishes the list of projects for which the public administration shall not warrant any authorization without an Environmental Impact Assessment describing direct and indirect consequences of the project to the environment.

Under the Title VI of this Organic Law, the article 81 stipulates that the following activities are prohibited:

1. Dumping or disposal of any solid, liquid waste or hazardous gaseous substances in a stream, river, lake and in their surroundings;
2. Damaging the quality of air and of the surface or underground water;
3. Non authorized bush burning;
4. Smoking in public and in any other place where many people meet;
5. Defecating or urinating in inappropriate place;
6. Spitting, discarding mucus and other human waste in any place.

For the article 87, It is prohibited to construct houses in wetlands (rivers, lakes, big or small swamps), in urban or rural areas, to build markets there, a sewage plant, a cemetery and any other buildings that may damage such a place in various ways. All buildings shall be constructed in a distance of at least twenty (20) meters away from the bank of the swamp. If it is considered necessary, construction of buildings intended for the promotion of tourism may be authorized by the Minister having environment in his or her attributions.

It is also prohibited to carry out any activities, except those related to research and science, in reserved swamps.

For the purpose of enforcement, the article 95 announces that anyone or association that does not carry out environmental impact assessment prior to launching any project that may have harmful effects on the environment is punished by suspension of his or her activities and closure of his or her association and without prejudice to be ordered to rehabilitate the damaged property, the environment, people and the property. Falsification and alteration of documents of environmental impact

assessment is punished in the same manner as what is provided for in paragraph one of this article.

3.2. Institutional framework for environmental management in Rwanda

The institutional framework for environmental management is currently registered in the Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda, published in the Official Gazette RWA Nº 9 of the 1st May 2005, particularly in its chapter III relative to the establishment of the institutions.

The article 65 of the Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda puts the Rwanda Environment Management Authority in place, REMA in English acronym. It is therefore this institution which is responsible for the follow-up of the environmental impact studies concerning investment and development projects.

The article 66 of the Environmental Organic Law specifies that it is established, at the Provincial, City of Kigali, District, Town, Municipality, Sector and the Cell levels; Committees responsible for conservation and protection of the environment. The organization, functioning and their responsibilities are determined by Prime Minister's Order, Article 15 of the law regulating mine and quarrying exploitation in Rwanda.

3.3. International legislative framework

The following laws, regulations and conventions are in line with this project and the national policies and laws:

- The international Convention on Biological diversity and its habitat signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 017/01 of 18 March 1995;

- The CARTAGENA protocol on biodiversity to the Convention on of Biological biodiversity signed in NAIROBI from May 15, to 26, 2000 and in NEW YORK

from June 5, 2000 to June 4, 2001 as authorized to be ratified by Law No 38/2003 of 29 December 2003;

- The United Nations framework Convention on Climate Change, signed in RIO DE JANEIRO in BRASIL on 5 June 1992, as approved by Presidential Order No 021/01 of 30 May 1995;

- The KYOTO Protocol to the framework on climate change adopted at KYOTO on March 6, 1998 as authorized as authorized to be ratified by Law No 36/2003 of December 2003;

- The RAMSAR International Convention of February 2, 1971 on Wetlands of International importance, especially as water flows habitats as authorized to be ratified by Law No 37/2003 of 29 December 2003;

- The STOCKHOLM Convention on persistent organic pollutants, signed in STOCKHOLM on 22 May 2001, as approved by Presidential Order No 78/01 of 8 July 2002;

- The ROTTERDAM International Convention on the establishment of the international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products, signed in ROTTERDAM on 11 September 1998 and in New York from 12 November 1998 to 10 September 1999 as approved by Presidential Order No 28/01 of August 2003 approving the membership of Rwanda;

- The BASEL Convention on the Control of Transboundary Movements of Hazardous wastes and their disposal as adopted at BASEL on 22 March 1989, and approved by Presidential Order No 29/01 of 24 August 2003 approving the membership of Rwanda;

- The MONTREAL International Conventional on Substances that deplete the Ozone layer, signed in LONDON (1990), COPENHAGEN (1992), Montreal (1997), BEIJING (1999), especially in its article 2 of LONDON amendments and Article 3 of COPENHAGEN, MONTREAL and BEIJING amendments as approved by Presidential Order no 30/01 of 24 August 2003 related to the membership of Rwanda;

- The BONN Convention opened for signature on June 23, 1979 on conservation of migratory species of wild animals as authorized to be ratified by Law No 35/2003 of 29 December 2003;

- The Washington agreement of March 3, 1973 on International trade in endangered species of Wild Flora and Fauna as authorized to be ratified by presidential Order No 211 of 25 June 1980.

3.4. Environmental Standards

Although Rwanda does not yet have specific laws on environmental standards related to mining and quarrying operations, it is important to note that Rwanda is highly committed to the principles of the sustainable development by advocating for environmental security and better welfare of its citizens through the promotion of a sound and environment friendly quarrying and mining activities. This is portrayed for instance through several bold and pioneering actions taken by the leadership of the country and aiming of protection of the environment for a better welfare of its people, such as the fundamental shift for artisan to industrialized mining, the banning of any economic activities (and removal of constructions) in wetlands.

In the absence of such specific legal and framework, however, the law regulating mining and quarrying activities, and the other relevant specific laws pertaining to environment still apply.

Nevertheless, the following are some of the environmental standards related to Environmental, Health and Safety guidelines generally accepted and which are also applicable in the case of Rwanda.

4. BASELINE DATA

4.1. General description of the NYABIGUGU site area

The project site is located on a small hill in Kigali City, Kicuciro district, Gahanga sector, Murinja cell. It is a semi rural area, where most of the people live of agriculture.

The site is situated by the road to Bugesera at the right hand side.

There are no wet lands existing in the site area. The required land for extraction of stones is an area of approximately 8,719 square meters. There are no passing through site area. Due care has been taken while identifying the project site to avoid habitations, forest lands and vicinity of wildlife sanctuaries, national parks and other sensitive areas.

There are no industries / factories in the vicinity of the site area and no residential houses either in the radius of 500 meters.

4.2. Bio-physical environment

This section gives in details the description of existing environment and describes the present land use of the project and area contiguous to it.

4.2.1. Physical environment

The site is situated on a sloping hillside with a dominantly loamy soil. There is only little natural vegetation consisting of grasses and bushes.

Table 1: Environmental setting in 5-km radius

N°.	**Parameters**	**Details**
1.	Latitude	$2^0$83'S
2.	Longitude	$30^0$56'
3.	Elevation ASL	1800.8m – 1911.24
4.	Climatic Conditions: - Annual Mean Max Temp. - Annual Mean Min Temp. - Annual Total Rainfall - Predominant Wind Direction	 29°C 16°C 910-1120mm N-S
5.	Land use at project site	Used to be used for artisanal stone extraction but currently redundant.
6.	Nearest Highway	By the Road Kigali-Bugesera
7.	Nearest Human settlements (Village / Town)	Gahanga residential area, approximately 3km
8.	Forest Reserve within 10km radius	None
9.	Ecologically Sensitive Zones (Protected Areas / Wetlands …)	Slope runs into a small valley down the hill which is used for subsistence agriculture which is also close to Nyabarongo river
10.	Notified Archaeological Monuments	None
11.	Water bodies	Nyabarongo river in about 3 km
12.	Defence installations	None
13.	Socio-economic factors	Small village, next to the project site

14.	List of factories / industries within 10km radius	None

4.2.3. Biological environment

The site selected for the implementation of the stone crushing plant in Kicukiro District has little natural flora, and the existing land use at the beginning of the project included subsistence crops like banana trees, sorghum and beans. The site also presents different types of bushes that can, on the wildlife point of view, shelter rodents and lizards or serve as ecological niche for various types of birds.

4.3. Socio-economical environment

The quarry is mainly surrounded by agricultural products grown mainly beans, sorghum, banana, maize and legumes such as tomatoes, etc…

The main domestic animals are cows, goats, sheep, and chickens.

4.4. Topography and surface geology

The site is located at 1400 m above sea level. There was no detailed geological study conducted however, the information got from OGMR indicated that the underground rock is a sedimentary rock formed through a process of lithification of weathered rock debris which was physically transported and deposited. Lithification could have occurred through:

- Drying and compaction;
- Oxidation of iron and aluminium;
- Precipitation of calcium and silica.

5. PROJECT DESCRIPTION – NYABIGUGU Site

5.1. Project size

Rwanda Stones & Construction Ltd Co. has been allocated approximately 8,719 square meters for extraction of stones. The project is expected to be highly mechanized so as to meet the production target. Equipments which are mandatory

for this project comprises five main machines which have been detailed as shown below:

Table. 2 List of mandatory machines for the project

	Equipments	**Quantity**
1.	**Jaw Crusher 36”x 24”**	**1**
	Body plate thickness: sail 50 mm	
	SwingJaw, stationary jaw,pitman,Toggle (RearFront): Steel casting	
	Bearing: Ecc-22340- Pedestral 23230	
	Ecc.shaft:En-8	
	Jaw Plate size (Teethed&Plain): 900mm x 1500mm	
	Fly wheel :Double	
	Max Feed:525 mm	
	Drive motor:70HP	
	Speed:280-300RPM	
	Weight: 21800Kg	
	Capacity: 130 to 150 tons with jaw setting off	
2.	**Jaw Crusher 30” x 15”**	**1**
	Body plate thickness: sail 50 mm	
	SwingJaw, stationary jaw, pitman, Toggle (RearFront): Steel casting	
	Bearing: Ecc-22324- Pedestral 22224	
	Ecc.shaft:En-8	
	Jaw Plate size (Teethed&Plain): 750mm x 860mm	
	Fly wheel :single	
	Max Feed:325 mm	
	Drive motor:40HP	
	Speed:320-360RPM	
	Weight: 8400Kg	
	Capacity: 60 to 70 tons with jaw setting off	
3.	**Jaw crusher 20”x12”**	**1**
	Body plate thickness: sail 36 mm	
	SwingJaw, stationary jaw,pitman,Toggle (RearFront): Steel casting	

	Bearing: Ecc-22340- Pedestral 22222	
	Ecc.shaft:En-8	
	Jaw Plate size (Teethed&Plain): 500mm x 750mm	
	Fly wheel :single	
	Max Feed:250 mm	
	Drive motor:30HP	
	Speed:320-360RPM	
	Weight: 4600Kg	
	Capacity: 30 to 35 tons with jaw setting off	
4.	**Vibrating Screen 16x5 (3.5 Deck)**	**1**
	Body plate thickness: sail 8mm	
	Bearing: 22324	
	Shaft:En-8	
	Shaft Dia:150mm	
	Pulley size:14	
	Drive motor:15HP	
	Weight 5500Kg	
5.	**Grizzly Feeder 1000x 3 mtr**	**1**
	Body plate Thickness: sail 16mm	
	Body liner 16 mm	
	Bearing 22320 (4 nos)	
	Ecc. Shaft: En-8 (2 nos)	
	Drive motor:15 HP	
	Speed:750RPM	
	Weight:4000Kg	
	Capacity 150 to 175 tons	
6.	**Other Spare parts**	**15**

Owing to the nature of work ie hard and risky all the equipment are expected to depreciated within two years only. By the third year an evaluation is needed to analyze and decided about their possible replacements.

The factory will be operational 8 hours a day six days a week. During the first year, production shall be maintained at the minimum level so as to maximize the

operationalisation of the mitigation measures of the project impacts to the environment and the production will be stepped up by 15% in the second year. Three machines will work at the same time to produce different sizes of gravels. The waste shall be used to produce gravel related products such as “bricks, cobbles, crusher fines etc. There are therefore four different types of products to be produced at the beginning of the project: Crushed rocks with different sizes, cobbles with two different sizes and crusher fines.

Table 3. Details of estimated production.

	Product types	Production (tons)		
		Daily	Monthly	Year 1
1.	½ crushed rocks	130	3120	37440
2.	¾ crushed rocks	60	1440	17280
3.	1-1 ½ crushed rocks	30	720	8640
4.	1 – 3 cobbles	25	600	7200
5.	4 – 6 cobbles	15	360	4320
6	Crusher fines	10	240	2880

Organizational structure

During the first year, the organizational framework of the project will be simple and flexible to allow any modification in case there is need. The staff of the project will include managers, technicians and excavating personnel. All employees will total to 60 expected to increase with time.

Twenty one (21) specialized stuff must have some experience at the beginning of the project in order to be able to train others in need (composed mainly by excavating personnel) The project will recruit experts from India during the first two years to assist the project in terms of quality and marketing standards.

The company will also construct a single block to accommodate the staff which will consist of the following:

- The main office
- Two rooms for the staff & meetings
- Two stores

- One room for the generator

In order to prevent trespassing and also ensure security of the project area, a burbled wire and metal bar fence will be installed. The project area will have two access gate ie the main access gate which will be five (5) meters wide with a metallic gate for easy entry and exit of heavy truck and a small gate for use of personnel on foot. To ensure security of the entire property, a construct will be made between the developer and a security company to provide 24 hour armed guards.

6.0 CONSULTATION

Stakeholders consultation process has been an important component of the Rwanda Stone and Construction Ltd (stone crushing project). A high priority was placed on the views of the public, local officials, community leaders in the proposed project site in order to ensure a fair environmental assessment process.
The intent of the Rwanda Stone and Construction consultation strategy has been to identify and incorporate a range of community values to ensure that the project was appropriately adapted to local context. The steps in the local consultation program were designed to identify and address stakeholders concerns about the project and to build positive, long-term relationships with the project community neighbors'.
The public consultation process began in May 2011 after receiving detailed Terms of Reference from RDB dated 27th May 2011. Consultation specific to the project was initiated through contacting the Environmental officer of Kicukiro District Mr. Jack, who thereafter provided the consultant team with contact persons at Gahanga Sector, and for Murinja Cell.
Throughout our consultation activities, interested and affected members of the public were provided with opportunities through the community leaders to voice their concerns. Their concerns and comments were integrated into the project designs and future quarrying planning to the greatest extent possible.
The consultation process was a crucial mechanism to inform the public, local authority and community leaders about the proposed project, purpose and aims of the project, but also served to elicit the issues, concerns, needs and requirements of interested and affected as input to the EIA.
As mentioned above the objectives of the public participation process included:

- The facilitation of focused key stakeholders involvement and consultation process to enable interested and affected people to provide input into the EIA process and share information;

- The investigation of the issues and concerns and site alternatives to function as an on-going data-gathering and facilitation tool for the input into the EIA process and for the development of the mitigation measures.

A background information document or project brief presented to RDB was also distributed and shared with key stakeholders consulted in this process. The document contained information regarding the proposed project activities,

information on the need for the EIA process. Stakeholders were grouped according to specific interests in the project.

Consultation goals and the process

Rwanda Stone and Construction representatives recognize the importance of stakeholder's role and community groups in the project design stage. The main goal of the consultation process;

- To keep interested and affected stakeholder informed and engaged in the development of the project;
- To respond to their concerns and interests; and
- To build a positive relationship with the projects community neighbors'.

To ensure an effective consultation process, a clear consultation strategy was determined by the EIA consultant team of Rwanda Stone and Construction, with the following key steps:

1. Identify stakeholders who may have a specific interest or concern regarding the project including local community leaders;
2. Meet with identified stakeholders or stakeholder leaders to listen to and understand their respective interests, concerns, and/or expectation in regard to this project. This included seeking input from stakeholders through a face-to-face meetings;
3. Develop means to address stakeholder's interests or concerns as they arise. This includes measures such as mitigating the project effects and /or modifying project design;
4. Provide timely and on-going updates to the stakeholders during this process;
5. Maintain an on-going and open communication with key stakeholders to ensure transparent operations.

The consultation process has been public and will continue into the operations phase of the project.

Key stakeholders consultation activities

Throughout the regulatory process, Rwanda Stone and Construction representative (Consultant team), has worked with a number of key stakeholders including: Local and District representatives, local residents. These meetings were held in face-to-face format by the EIA consultant team in order to provide meaningful feedback about the project and to build relationships with interested stakeholders.

At the initial stages of the consultation process, the EIA consultant team compiled a date base of key stakeholders who may desire a higher level of involvement in the

EIA process. This list of identified stakeholders was shared with the District Environmental Officer of Kicukiro. The meeting focused on presenting the most recent project plan, bringing forward any potential effects and benefits of the project, and determining if any specific mitigation measures were required. An important conclusion of this meeting was the determination of the appropriate level of future consultation that was agreed upon by both parties.
Specifically, the EIA consultant team held project meeting with the following key stakeholders:

- Kicukiro District through the District Environment Officer;
- Gahanga Sector Executive Secretary;
- Murinja Cell Executive Secretary; and
- Umudugudu of Nyabigugu community leader.

The consultation method for these groups was largely consisted of face-to-face meetings.

Initial consultation

A series of meeting were held at different levels in June 2011. The initial consultation meeting was held on 20th June 2011, with Mr. Jack the Environmental officer of Kicukiro District. This was intended to allow us to gather more and detailed information at the District level especially on the concerns or conflicting interests that may exist for the proposed project site. This was also intended to provide feedback on how issues that could be raised by the District will be addressed in the EIA report.
During this meeting, contacts were provided for the sector level key informants to consult and those at Cell and Umudugudu level.

ADDRESSING CONCERNS

SUMMARY OF CONCERNS

To date, stakeholder input has largely focused on creating an appropriate and contextual design for the project in coordination with community input. Areas of particular interest have included the preparation of effective environmental and socio-economic impact assessment, the mitigation of environmental effects.
Most stakeholder's comments, and concerns focused cumulative effects and the need for clarity around the project operations.
A brief summary of the stakeholders concerns that were incorporated into the project

Summary of Project Plan Modifications	
Concern	**Plan Modification**
Dust and fugitive emissions	Project for stone crushing and screening facility is planned to be portable and partially enclosed to mitigate dust concerns

Noise	Stone crushers are planned to partially enclosed, using steel frame and insulted cover in order to mitigate noise concerns and to achieve compliance with the Rwanda environmental Law. This enclosure will also work in mitigating dust emissions and potential health concerns.
Effect to the Marshland downstream	Terraces will be constructed downstream to mitigate potential sedimentation of the marshland
Proximity to highway	The quarrying activities will not extend beyond the site that was under used by Strasburg stone crushing.
Nyabarongo River	Constructed terraces planted with agro-forestry trees downstream of the entire site is expected to mitigate potential sedimentation of the river

Contacts of persons consulted

Names	**Position**	**Contact Cell phone**
Jack	Environmental Officer Kicukiro District	0788686923
Niyireba Ashiri	Gahanga Sector Executive Secretary	0783097321
Uwineza Evangiline	Murinja Executive Secretary	0788869318
Habimana Pascal	Umudugudu Community leader	0782941632

7. EVALUATION OF IMPACTS

7.1. NYABIGUGU Sites – Kicukiro District

During conducted site visits, we noted that there is no economic activity going on since all the artisanal extraction of stones is no longer going on. The first inhabited houses are located at a distance of about 100 m from the project site.

There is very little natural vegetation considering the agricultural activities in the vicinity of the project site. The project would definitely have some impacts (positive and negative) on the surrounding environment in both direct and indirect ways, as

there will be direct and indirect interactions between project activities and the environment. This will have different effects on the environment and on the project itself.

This chapter identifies analyses and classifies these impacts that could arise from the activities of the project, either during the extraction phase, crushing or transportation The impacts apply as well on the socioeconomic environment (health, security, economic activities, finances, etc) and on the biophysical environment (fauna, flora, water, air, soil, energy).

These impacts can also be positive or negative, direct or indirect and they are described in this study.

7.2. Impacts classification

The impacts are classified and their range varies in space and time. The intensity of theses impacts is classified according to the following criteria:

- Effects on the health species
- Effects on endangered species
- Reduction of the diversity of species
- Loss of habitats
- Transformation of natural landscapes
- Impacts on the human health
- Effects on the present use of available natural resources
- Abandonment of either use or future production of natural resources

The criteria of classification of the impacts as being important, middle or weak are according to:

- Size and geographical extent
- Duration and Frequency
- Irreversibility
- Ecological context

7.3. Identification of Potential Impacts of the project

The Major impacts that are expected to arise as a result of the implementation of the project are the following:

7.3.1. Potential Positive Impacts of the project

- Supply the stone for construction sector in Rwanda at a reasonable price

- Job creation and employment opportunities for those who will be employed by the project, either in the extraction or transportation;

- Improvement of general welfare for the local population as a result of increased income;

- Increased economic activities directly or indirectly related to the project;

- Increase in the income of the population working on the site and development of small businesses that will serve the employee of the staff;

- Possibility of meeting the fundamental social needs for the employees and their families (health care, schooling children, “mutuelle de santé” etc;

- Possibility of savings for the local population and employee of the factory.

- Payment of taxes to the local and central government

7.3.2. Potential Negative Impacts of the project

- Risk of excess soil being eroded from the site during extraction and deposited downhill and finally into the wetland ;

- Loss of habitat for some fauna and flora species and biodiversity reduction as a consequence of migrating species due to vegetation clearing of the quarrying site;

- Degradation of air quality due to stone dust emitted by crushing of activities;

- Risk of accidents during the extraction phase;

- Effects of pollution from human waste employed at the plant ;

- Effects of generated solid wastes;

- Contamination of ground water by generated oil from the maintenance of the machines;

- Risk of increase in road accidents resulting from increase in road traffic;

- Risk of noise pollution of plant machinery and vehicles and its related impacts like air pollution increased in the area;

7.4. Evaluation and analysis of the projects' impacts

In this section, the impacts of quarrying and crushing related activities on the human and biophysical environment are evaluated and analyzed.

7.4.1. Impacts on the human environment

Table 3: Impacts on the human environment during the quarrying and crushing activities

#	Impacts	Classification
1	Employment opportunities to the population of the zone directly concerned with the works and to the people in the vicinity.	Positive, important and long term
2	Increase in the income of the population working on the site and development of small businesses that will serve the employee of the plant	Positive, important and long term

3	Possibility of meeting the fundamental social needs for the employees and their families (health care, schooling children, “mutuelle de santé”, etc.	Positive, important and long term
4	Possibility of savings for the local population and employee of the stone crushing plant.	Positive, important and long term
5	Risk of the increase of HIV/AIDS and other Sexually Transmitted Diseases due to the increase in income which may cause unsafe behaviours.	Negative, middle and temporary impact
6	Risk of the accidents on the personnel of the site. Some of the workforce may not be familiar to quarrying techniques which can be a cause of accidents. If the protection equipment is not adequate accidents are most likely to occur.	Negative, middle and temporary impact
7	Provision of country with all the needed stones	Positive, important and permanent impact

7.4.2. Impacts on the biophysical environment

Table 4: Impacts on biophysical environment during the quarrying of stones

#	**Impacts**	**Classification**
1	Air pollution by the dust emitted during crushing.	Negative, middle and long term
2	Risk of excess soil being eroded down from the quarrying site	Negative, middle and temporary impact
3	Loss of habitat for some fauna and flora species and biodiversity reduction as a consequence of migrating species due to vegetation clearing of the quarrying site;	Negative, middle and permanent impact
4	Soil erosion due to exposure of the soil after removal of ground cover;	Negative, middle and temporary impact
5	Effects of generated solid wastes;	Negative, middle and permanent impact
6	Risk of noise pollution of machinery and vehicles and its related impacts like air pollution increased in the area;	Negative, weak and permanent impact
7	Risk of increase in road accidents resulting from increase in road traffic especially due to big trucks that come to by stones;	Negative, weak and permanent impact

8.0. Analysis of alternatives

This chapter analyzes the possible alternatives besides the methods and other parameters already considered in the design of the project.

Bearing in mind the critical need for the protection of environmental ecosystems and the core role that the stone crushing plant will play in the social and economic development of the country, it's imperative to analyze and balance the need for planet, people and profit in the context of the sustainable development.

In the scenario where Rwanda Stone is not permitted to quarry in the site in question, soil erosion will still be evident given the fact that the site was already been quarried before and no rehabilitation of the area was done.

The provision of good quality stone for different construction purposes will not be achieved as will be the case when the quarrying is permitted.

The neighbouring population will not benefit from the natural resource available.

9. MITIGATION MEASURES

This section provides measures envisaged to avoid, reduce minimize present or compensate negative impacts of the project. Considering the project design, most of the mentioned impacts are not likely to happen. The following mitigation measures which consider policy, engineering and social-economic interventions, have been recommended.

9.1. Air pollution

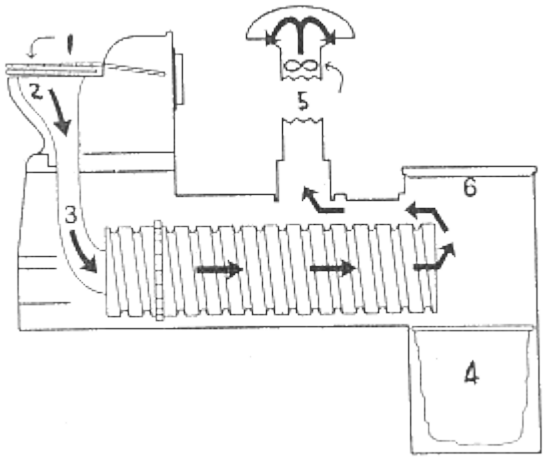
During stone extraction and crushing, it is anticipated that the surrounding air might be polluted by the dust emitted during crushing. For this it would be important to constantly water the site so as to reduce the amount of dust emitted in the air. Also appropriate machines should be used for crushing as well as the appropriate stones i.e the hard ones which produce less dust. The water to be used will be delivered by a tank from EWSA during the dry season and stored in a plastic tank at the project site. During the dry season, rain water harvesting will be maximised which will reduce the cost of buying water but also reduce the problems by storm water from

upstream to neighbouring population. Detention basins will have to be established at the lower side of the plot/site to allow catchment of water run-off from the site.
To avoid the risk of excessive soil erosion, radical terraces should be constructed at the lower part of the site and also plant grass preferably elephant grass and trees so as to stabilize the soil.

9.1.2. Human waste management

Toilets will be set up. The best system is to use the "Ecosan" system consisting of plastic cabins with regularly empty able contains. This is a sanitation system that does not require any water to function. Not only does it save on water use, but it is entirely isolated from the surrounding environment and cannot contaminate underground water resources. The system utilizes a natural biological process to break down human waste into a dehydrated odorless compost-like material.

The following is a brief description of the ECOSAN toilet concept as well as its main features: Description of Ecosan toilet system.



The human excrement falls down a vertical chute (2) and into one end of a specially designed helical screw conveyor (3). Every time the toilet lid (1) is lifted, a mechanism rotates the conveyor. With each rotation the human excrement slowly moves along, taking approximately twenty five days before falling into a reusable collection bag (4). It takes six months for the bag to fill with dry and odorless waste.
Through the uniquely designed ventilation pipe (5), adequate airflow is provided for the dehydration / evaporation, deodorising process. Human excrement consists of roughly 95% moisture. As the solids dry in the conveyer the urine and moisture is vented into the atmosphere. The solid waste then dries into a compost-like material, roughly 5 - 10% of its original mass.

As a variation on the home model designed for normal use, a special modification was made to accommodate installations where there is a high frequency of use of toilets. This model uses a drum instead of a bag for waste collection. The unit is therefore not a completely dry system and also means that the drum needs to be emptied on a regular basis. This unit is ideally suited for places where the installation of sewerage pipes are difficult, for instance underground mines or very busy public places.

The dry waste is manageable and can be processed and used in the making of compost, dispose of it by using municipal waste services or use it as a source of fuel.

9.1.3. Mitigation measures for solid waste

Solid waste from the stone crushing plant is mainly organic waste produced by the employees of the plant. All these wastes must be separated after their production, collected and managed according to their nature. The principle of waste prevention, minimization/reduction will be implemented in the Plant. Waste, will be minimized, recycled or reused. There is a possibility of the project giving rise to metal scrap expected to originate from old parts of the machines. They will be collected and sold periodically to the steel rolling factory which collects scrap all over the country.

9.1.4. Measures to avoid road and on site accidents

The major stone crushing operation will be carried out in the workshop. Condition for acceptable working environment will be respected, i.e. sufficient acceptable level of noise, permanent availability of drinking clean water… Moreover, as safety measures for staff / workers during operation, employees will be equipped with adequate equipment;

- Protective uniform
- Dust Masks
- Helmets
- Eye goggles with a dark shade so as to protect the workers from the bright sun shine

First aid equipments should be available at the site at all time, and several individuals among the permanent personnel on the site should have the skills necessary to use the equipment.

A contract should be signed between management of the stone crushing plant and the nearest dispensary or hospital for taking care of injured staff in case of accident.

The insurance should be contracted for all the personnel during the construction phase and for those who will be employed in the factory during the operation phase.

Workers will be regularly trained on the use of the equipment as well as on the safety measures and procedures so as to limit the risk of accidents due to the ignorance in the equipment use as well as the importance of the safety procedures.

Table 7 below summarises all the proposed mitigation measures in line with the anticipated impacts

Table 7: Mitigation measures

#	Impacts	Mitigation measures
1	Air pollution by the fugitive emission generated during drilling, blasting, excavation, breaking and loading of the stones	• Soil watering when soil works are being executed and where dust is emitted.
2	Risk of excess soil being eroded down the wetland below the site	• Construction of radical terraces and planting of grass and trees on those terraces. • Maximization of storm water harvesting and used during the dry season.
3	Loss of habitat for some fauna and flora species and biodiversity reduction due to vegetation clearing of the site;	• During land clearing, to maintain a maximum of vegetation • Implementation of agro forestry techniques well adapted to the site
5	Risk of the accidents on the personnel of the site. Some of the workforce may not be familiar to quarrying techniques which can be a cause of accidents. If the protection equipment is not adequate accidents are most likely to occur.	• Provide all staff on quarrying site with protective equipments (helmets, gloves, coats and boots where applicable). • To teach the workers how to use adequately these equipments

6	Risk of the increase of HIV/AIDS and other Sexually Transmitted Diseases due to the increase in income which may cause unsafe behaviours.	• The biggest workforce will be recruited from the region, and they normally return to their homes. • Sensitization campaign to the staff on HIV/AIDS and other STDs, and avail condoms on site, free of charge.
7	Effects of generated solid wastes;	• The garbage will be sorted on site and 5 categories of wastes will be treated separately. • Regular inspection of the site • Remove the soil degraded • Efforts will be made to utilize the solid waste to the extent possible. The non usable part would be appropriately dumped in an officially designated area.
8	Contamination of ground water by generated by used oil from the maintenance of the machines;	• Regular inspection of the machines • Used oil will be collected, stored in water tight recipients and taken to reuse or recycling plants • Maintain storage and disposal area to prevent accidental release • Provide spill mitigation equipment, double wall tanks and / or diking storage tanks
9	Risk of increase in road accidents resulting from increase in road traffic;	• Regular maintenance of the road • Humps added where needed. • Use of traffic signs
10	Risk of noise pollution to surrounding population	• Technology to be used is that that doesnot emit noise when blasting the rock • When ever the project expects to have an increase in noise emitted, the developer will use a mobile public address system to prepare the population around 3 days before.

10. REHABILITATION PLAN

The aim of rehabilitation is to provide a reshaped landform to allow for residential subdivision. Earthworks involving cut and fill, will b required to shape and rehabilitate the land form at the end of the project. It is expected there will be a balance of cut and fill across the entire project site and therefore it is unlikely that fill would need to be imported into the site.

The pit will be filled by the soil from the site and levelled. Tree species that are environmental friendly will be planted as well as grass preferably elephant grass will be planted so as to stabilize the soil. It is believed that after this the plot will be

ready for re utilization as the relevant authority deems it necessary. The master plan of Kigali City indicated that the area is to be used as a commercial end when actual implementation of the same starts.

11. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

This section describes the modalities provided in the project for the implementation of the proposed mitigation measures to its potential negative impacts. It proposes the institutional responsibilities for the implementation of the mitigation measures, the implementation indicators, the time frame for monitoring and follow-up and also the estimated cost for the implementation activities. The Environmental Management Plan of the stone crushing plant is summarized in a table below.

11.1. Detailed description of the modalities to implement the proposed mitigations measures

Table 8: The Environmental Management Plan

Quarry Site	Negative Impacts	Mitigation measures	Implementation indicators	Timeframe	Responsibility	Estimated cost (USD)
NYABIGUGU - Kicukiro	Risk of the accidents on the personnel of the quarry site	• Provide all staff on with protective equipments (helmets, gloves, coats and boots where applicable). • Use adequately these equipments	• Number of accidents on site • Availability of protective equipments	Throughout the project cycle	Rwanda Stones & Construction	1000 $
	Risk of the increase of HIV/AIDS and other Sexually Transmitted Diseases (STD)	• The biggest workforce will be recruited from the region, and they normally return to their homes. • Sensitization campaign to the staff on HIV/AIDS and other STDs, and avail condoms on site, free of charge.	• Number or % of workforce recruited • Number of Sensitization campaigns on HIV/AIDS and other STDs, and avail condoms on site free of charge	All the project life	-Rwanda Stones & Construction Co. Ltd -MINISANTE -Local Authorities	USD 2200
	Pollution of surface and ground water from due to oil from machines	• Oil servicing of machines will be made in garages.	Number of times when service is done	All the project life	Rwanda Stones & Construction Co.	To be included in the investment plan

	Any oils available at the site will be collected in appropriate jerry cans and taken to the petro station where servicing is done for recycling				
Increase in the risk of health because of the noise from the machines and air pollution from fugitive dust	• Use of machine with minimum noise and select only new machines and vehicles • Soil watering	Noise intensity of machines Amount of dust in the atmosphere	Entire life of the project	• -Rwanda Stones & Construction Co.	To be included in the Investment plan
Air emission by dust emitted during site clearing	• Soil watering during the time of soil works	Amount of dust in the atmosphere	During the construction of the administration building	-Rwanda Stones & Construction Co.	To be incorporated in the investment plan
Risk of excess soil being eroded and deposited in the wetland beneath the quarry site	• Construction of contours on the steep slope of the hill and planting of grass and trees on the radical terraces • Establishment of storm water retention basins at the lower side of the site	• Area covered with terraces and vegetation	Initial stages of the quarrying activities Initial stage of the quarrying activities i.e first rainy season.	• -Rwanda Stones & Construction Co. Rwanda Stone & Construction Co.	To be incorporated in the investment plan
Loss of habitat for some	Implementation of	Number of agro forestry	Entire life span	• -Rwanda	2000 $

flora and fauna species and biodiversity reduction as a consequence of species migration due to vegetation clearing on the construction site	agro forestry techniques well adapted to the site	trees planted	of the project	Stones & Construction Co. • Local authorities	
Noise during the crushing of stones	• By use of public address systems to alert people on the time of the noise. A radius of 3km from the quarry will be covered. • By use technology other than use of dynamites.	Quality and numbers of announcement	Entire life span of the project	• -Rwanda Stones & Construction Co. • Local Authorities	To be included in the investment plan
Effect of generated solid waste	• To take the rest solid waste in the appropriate dumping site • Garbage will be sorted on site and 5 categories of waste will be treated separately	• 5 categories to be treated separately • Contract with the garbage collector (local NGO)	During Operation	• -Rwanda Stones & Construction Co. • Local Cleaning NGO • Local Authority	USD 200 /yr
Risk of increase in road accidents resulting from increase in road traffic	• Regular maintenance of the road • Humps added	• Number of road accidents	Entire life of the project	• -Rwanda Stones & Construction Co.	1000USD/yr

	where needed • Use of traffic signs			• National Police • Local Authority	
Risk of fire accidents	• Fire fighting equipment should be installed with more attention paid to the safety and security of the machines • The extinguishers should be regularly inspected and maintained • The personnel of the plant must be trained on their use	• Fire fighting equipments installed • Number of fire accidents avoided	During operation	• -Rwanda Stones & Construction Co. • National Police • Local Authority	The cost of the fire fighting equipment to be incorporated in the investment plan The costs for maintenance and training of the staff: USD 800/yr

12. CONCLUSION AND RECOMMENDATIONS

12.1. It is concluded that;

- The total fugitive dust emission rate for the stone crushing plant will not have significant incremental or cumulative dust impact at both sites and should equate to less than 0.5% of the existing total dust emissions.
- The use of dynamites for blasting of the hard rocks should be used only as the last resort since it can cause shocks to neighbouring populations. The use of the dynamite should not be used to avoid consequences like trauma to neighbouring population and cracking of houses.
- The erosion from the site can be managed to a minimal only by construction of radical terraces and planting grass and trees for soil stabilization.

12.2 Recommendations

It is recommended that;

- Dust suppression machine should be available on each site for wetting of all the materials to avoid effects of dust such as respiratory diseases.
- All appropriate environmental management measures detailed in this report, together with any other environment management commitments should be implemented throughout out the entire life of the project.

REFERENCES

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APPENDICES

1. Terms of Reference,

2. Land ownership document