An Updated

Environmental Management Plan

For the renewal of an

Environmental Clearance Certificate

To Permit Quarrying of Shale Clay from Nine Mining Claims and Hauling to a Clay Brick Factory

Ruacana District, Omusati Region

April 2023

Prepared for: **Ruacana Clay Products CC**

Reference No. **APP-001174**

RUACANA BRICK *A brick to build on*	Ekwao Consulting

PROJECT TITLE NAME
An Updated EMP to Permit Quarrying, Loading and Hauling of Shale Clay from these Mining Claims: MC-68318, MC-68584, MC-68585, MC-68586, MC-71581, MC-71582, MC-71583, MC-71584 and MC-71604 Ruacana District, Omusati Region **Renewal of an Environmental Clearance Certificate**
APPLICATION REFERENCE NO.
APP-001174
PREPARED FOR
RUACANA CLAY PRODUCTS CC Project Manager Fax: 088 645 026 Cell: 081 621 5260 Email: poxboys@gmail.com Postal Address: P O Box 25021, Windhoek, Namibia Physical Address: Ptn 1 of Farm Ruacana 1168, C35 & C46 Highways, Ruacana, Namibia
PREPARED BY
EKWAO CONSULTING CC Joel Shafashike Cell: 081 127 3027 Fax: 088 645 026 Email: ekwao@iway.na Address: 95 Papageienweg, Hochland Park, Windhoek, Namibia
DATE PREPARED
April 2023

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ABBREVIATIONS AND ACRONYMS

BAT	-	Best Available Technology
dBA	-	Decibels
CC	-	Close Corporation
EC	-	Environmental Commissioner
ECC	-	Environmental Clearance Certificate
ERP	-	Emergency Response Plan
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
GPS	-	Global Positioning System
GRN	-	Government of the Republic of Namibia
ha	-	hectare (1 ha = 10 000 m^2)
HPP	-	Harambee Prosperity Plan
IAPs	-	Interested and Affected Parties
m^2	-	square meters
MAWLR	-	Ministry of Agriculture, Water and Land Reform
MCs	-	Mining Claims
MEFT	-	Ministry of Environment, Forestry and Tourism
MHSS	-	Ministry of Health and Social Services
MME	-	Ministry of Mines and Energy
NCCI	-	Namibia Chamber of Commerce and Industries
NHC	-	National Heritage Council
LDV	-	Light Duty Vehicle
NSI	-	Namibia Standards Institute
ORC	-	Omusati Regional Council
PPE	-	Personal Protective Equipment
QM	-	Quarry Manager
RA	-	Roads Authority
SHE	-	Safety, Health & Environment
SME	-	Small and Medium Enterprises
WHO	-	World Health Organization

LIST OF ROADS

C35	-	The route number for the road starting from the coastal town of Henties Bay to Ruacana through Uis, Khorixas, Kamanjab and Omakange Settlement.
C46	-	The route number for the highway which starts from B1 in the town of Ondangwa to Ruacana via Oshakati, Oshikuku and Outapi.
D3700	-	The route number for the district road from the intersection of C35 and C46 in Ruacana leading to the Ruacana Waterfall & Ruacana border and proceeding along the Kunene to the Epupa Constituency in the Kunene Region .

DEFINITION OF TERMS

Accessory works:

Means any buildings, plant or other structure required for purposes of mining operations or for the disposal of any mineral mined in the course of any such operation, including

(a) Any power plant, transmission line or substation;
(b) Any water boreholes, well, pipeline, pump station tank or dam;
(c) Any airfield, helicopter landing-pad, road, gate, rail or railway siding;
(d) Any workshop, hangar, store or office;
(e) Any explosive magazine;
(f) Any sampling plant, processing plant, smelter, etc.
(g) Any waste disposal site, and
(h) Any campsite or temporary or permanent, etc.

Beneficiation

In the context of this project means crushing, milling and thoroughly mixing of shale clay into a mouldable paste substance followed by extrusion and cutting of bricks, drying and firing.

Brick Clay

Brick clay is a term used to describe 'clay and shale' used in the manufacture of clay based building materials such bricks, face bricks, clay hollow blocks, etc. In this report, brick clay and shale clay are used interchangeably and actually meant the same thing.

Cumulative Impacts

In the context of quarrying, cumulative impacts would mean the impacts of quarrying activities which in themselves may not significant but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or underrating in the area.

Environmental Component/Aspect

An attribute or constituent of the environment (i.e. air quality; waste management, seismicity, soil, groundwater; terrestrial ecology, noise, traffic, socio-economic) that may be impacted by the proposed project.

Environmental Impact

A positive or negative condition that occurs to an environmental component as a result of the activity of a project or facility. This impact can be directly or indirectly caused by the activity.

Environmental Impact

A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

Environmental Management Plan (EMP)

A working document which contains site specific plans to ensure that environmental management practices to eliminate and control environmental impacts are followed during the developmental phases of that site, project and or facility and would normally consist of construction phase, operational phase and decommissioning phases.

Environmental Monitoring

Means collection, evaluation and summarization of environmental data by continuous or periodic monitoring of certain qualitative and quantitate indicators characterizing the state of environmental components and their modification as a result of the impact of natural and anthropogenic factors.

Excavation

Means any trench, pit or other open working made in the course of prospecting or mining operations excluding superficial excavations made for purposes of geochemical soil and rock sampling.

General Waste:

Waste that does not pose an immediate threat or hazard to health or the environment: domestic waste; business waste and inert waste.

Hazardous Waste

Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have detrimental impact on health and the environment.

Interested and Affected Parties

All persons who may be affected by the project either directly or indirectly, or who have an interest or stake in the area to be affected by the project, including neighbouring landowners & Road Fund Administration.

Mining Claim Means a claim not exceeding an area of 18 ha registered under section 36 of the Minerals Act and includes the renewal of the registration of any such claim.
Mitigation: Measures designed to avoid, reduce or remedy adverse impacts.
Non-compliance: Issues that are in direct non-compliance with the requirements, commitments and/or management measures as approved in the EMP.
Overburden The soil layer that lies above the shale clay slates below 350 mm from the ground level. The first 350mm layer of the overburden comprises of topsoil which supports the rooting system for vegetation and should be set aside and preserved for future rehabilitation.
Quarrying Refers to surface mining that is intended for the production of sand, clay, dimension stones, limestone and aggregates which can be gravel or crushed stones.
Sensitive Area A sensitive area or environment is described as an area or environment where a unique ecosystem, habitat for plant and animal life, wetlands or conservation activity exists or where there is high potential for ecotourism
Shale Clay Shale clay is a fine-grained, sedimentary rock formed as a result of the compaction of clay, silt, mud and organic matters over time and is usually considered equivalent to mudstone. In this report shale clay and brick clay are used interchangeably and actually meant the same thing.

1 PROJECT BACKGROUND

1.1 INTRODUCTION

Ruacana Clay Products CC (**'RCP'** for short) held nine Mining Claims (MCs) pegged and registered with the Ministry of Mines and Energy (MME) in terms of the Minerals Act. The MCs have secured access to an industrial mineral specifically shale clay which is suitable for the manufacturing of clay based building materials. These are bricks such as stock bricks (requiring plastering), face bricks (requiring no plastering of external walls), hollow clay blocks (for single leaf walling), paving bricks and rooting tiles.

The ECC was granted on 15 April 2020 and is due to expire on 15 April 2023. This report is therefore prepared to support the ECC renewal application to which a reference number of **APP-001174** was allocated by MEFT.

1.2 THE APPLICANT

The particulars of the applicant are as shown in Table 1, below: follows:

Table 1: Details of the Applicant

Promoter	Ruacana Clay Products CC
Registration Number	CC/2005/2586
Trade name	Ruacana Brick
Postal Address	Box 25021 Windhoek Namibia
Physical Address	Ptn 1 of Farm Ruacana 1168 Off C46 Highways Ruacana, Omusati Region
Contact Person	Taapopi Shilongo (Mr)
Designation	Project Manager
Contact Details	Mobile: 081 621 5260 Fax: 088 645 026 Email: poxboys@gmail.com & ekwao@iway.na

1.3 CHANGES DURING THE ECC TENURE

Since RCP was granted an ECC on 15 April 2020, there has been no material changes to its scope of operation, its members, its management, its physical address and its contact details.

1.4 ACTIVITIES UNDERTAKEN DURING THE REVIEW PERIOD

Due to structural recession experienced within the domestic built environment, more specifically with relatively low activities taking place within the construction subsector, RCP did not proceed with the implementation of the project during the validity period of the ECC.

However, minimal exploration work was carried out which confirmed the extend of the shale clay resource in the Ruacana Valley. Investigation has shown that a resource base of between 2.7 and 3.4 million tons were mineable. At an annual extraction rate of 60 000 tons, the upgraded resource base can support the brick factory for over 50 years.

Since the project has not been implemented, the EMP originally presented to MEFT has been reproduced and submitted with minimal updates.

1.5 UPDATES TO THE EMP

The ECC had permitted RCP to undertake two core listed activities which are:

a) The quarrying shale clay (the raw materials) from nine (9) MCs located in the Ruacana Valley and transport the quarried materials to a clay brick factory located on urban land in the town of Ruacana.

b) The beneficiation or manufacturing activities taking place at the brick factory. The MCs and brick factory are situated ±18 km from each other.

With this renewal, the ECC is updated to reflect to key changes:

a) The beneficiation or value-addition activities previously covered by the expired ECC is no longer an activity to be conducted by RCP.

b) The scope of activities under the updated ECC is now confined to quarrying and hauling of raw materials to the clay brick factory.

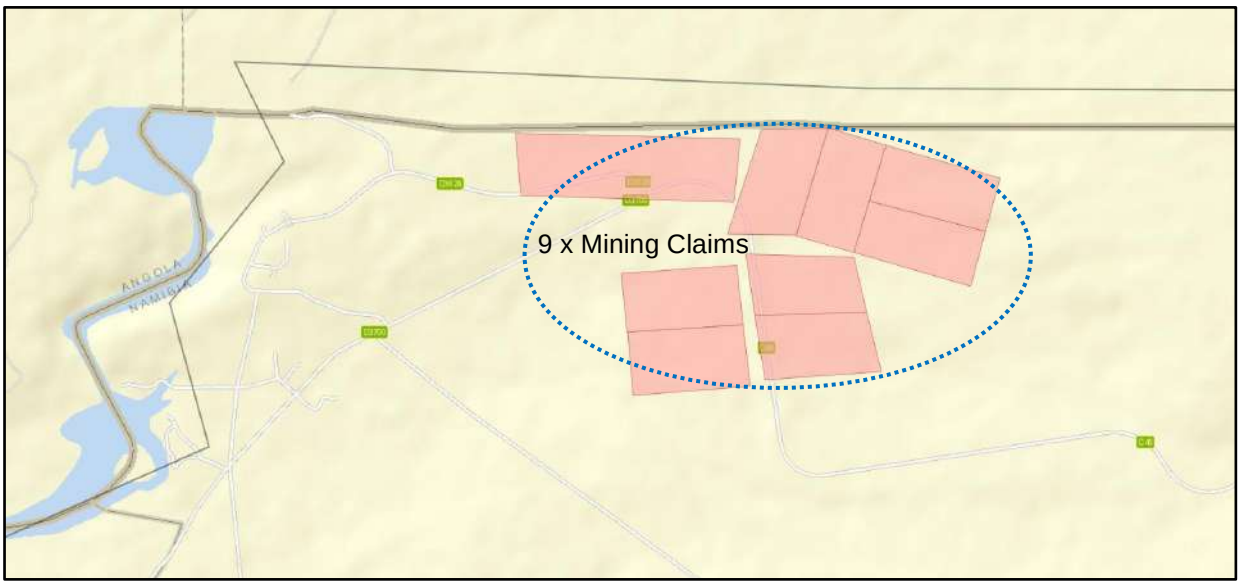

Figure 1: Location of the Mining Clams

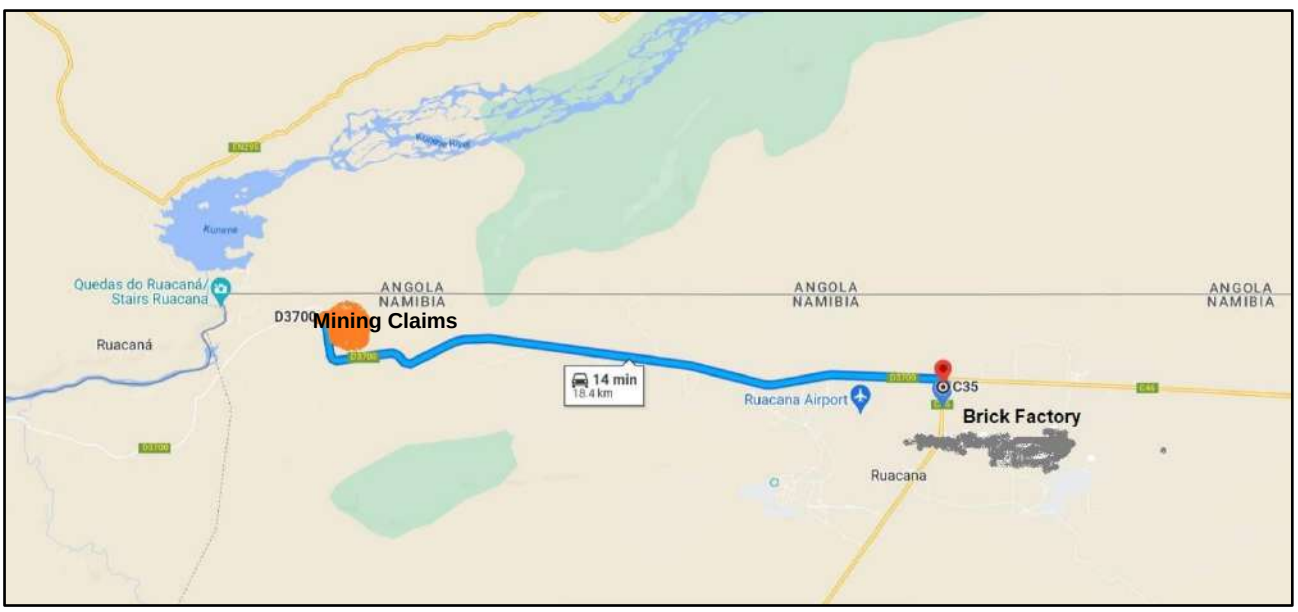

Figure 2: Mining Claims in Relation to Brick Factory

2 DESCRIPTION OF THE ACTIVITY

To appreciate the potential environmental impacts associated with the operation and management measures recommended to mitigate such impacts, it is important to understand the nature of the operation being undertaken and the activities involved.

The expired ECC had permitted two main activities to be undertaken - the quarrying of shale clay from MCs and beneficiation of the raw materials into clay based building materials. With the renewal, beneficiation is dropped from the activities undertaken by RCP. With the renewal the core activities will be quarrying of shale clay and hauling to a brick factory.

2.1 QUARRYING OF RAW MATERIALS

The operation will be conducted with two pieces of machinery and associated equipment as listed in Table 1 below. he machinery and equipment listed in Table below. It is important to stress that the operation to supply raw materials to the brick factory will be performed over a period not seven months each year, starting in April up to October. No quarrying and hauling of raw materials will be performed during the months of November up to March which are considered rainy months in the project area.

Table 2: Machinery and Equipment for the Operation

Equipment/Machinery	Quantity	Comments/Remarks
Bulldozer	One (1)	A heavy duty bulldozer equivalent to a CAT7 will be used to rip, cut open and doze the shale clay onto in-pit stockpiles. **Drilling and blasting are not required**.
Excavator	One (1)	A 30 ton (minimum) excavator will load the raw materials from the in-pit stockpiles into tipper trucks. At some section of the pit, free loading by the excavator will be possible.
Tipper truck	Two (2)	Tipper trucks with payloads of 20 m^3 (30 tons) are used to haul the raw materials over 18 km distance to the brick factor.
Pickup (Bakkie)	One (1)	A pickup vehicle will be dedicated to the operation for use by the Quarry Supervisor.
Diesel bowser	One (1)	A 2 000 litre diesel bowser is used to refuel the bulldozer and excavator and will be kept at the brick factory

The quarrying method used is known as 'sequential strip mining' which involves three steps, that are performed in sequences.

2.1.1 TOPSOIL

In areas of the MC where the shale clay is not exposed to the surface, topsoil is removed from the natural ground level down to a depth of about 350mm. These materials are removed in thin strips and stockpiled along the perimeter of the quarry to form small bunds. Organic matter and nutrients which support vegetation and plants are contained in the topsoil. This materials is therefore preserved for the future rehabilitation of the quarry pit.

Heights of topsoil stockpiles are not to exceed 1.5 meter so as to ensure protection against wind and soil erosion. To keep the topsoil biological active, vegetation growth on the topsoil stockpiles should be encouraged.

2.1.2 OVERBURDEN

Any soil materials below 350 mm that is not shale clay is to be treated as overburden and stockpiled aside for future use in the rehabilitation of the quarry pits. Topsoil and overburden are to be kept on separate stockpiles and not mixed together.

During the rehabilitation of the quarry pit, the overburden is placed first and profiled followed by the topsoil. The natural location to place overburden is to the west and northern side of the quarry pit. This will serve two purposes - to minimise noise transmission from active working areas in the pit and to reduce visual impacts to

the motorists using the D3700 road as well as to capture any fugitive dust that may escape from the quarry area.

2.1.3 EXCAVATION

The excavation of brick clay will follow after the topsoil and overburden are removed and stockpiled. One heavy duty excavator (30 ton) fitted with a single sank ripper is the only machine required in the extraction of brick clay.

The bulldozer will start working on relatively small areas of the MC, measuring about 1.5 ha to 3 ha that are gradually expanded to cover most of the footprint of clay resource. The brick clay has a hardness of between 0.7 to 2.8 on MOH's hardness scale which makes it an ideal material for ripping and dozing.

Ripping has both economic and environmental benefits when compared to other methods such is drilling and blasting which require the use of explosives and detonators. Blasting is further associated with excessive dust generation, noise pollution, vibrations and flying rocks which are environmental hazardous.

A bulldozer is a good working order and operated by an experienced and skillful operator is able to generate in excess 3 000 m^3 in single shift of 8 hours. Theoretically, the annual brick clay requirements of 40 000 m^3 can be excavated within 20 days.

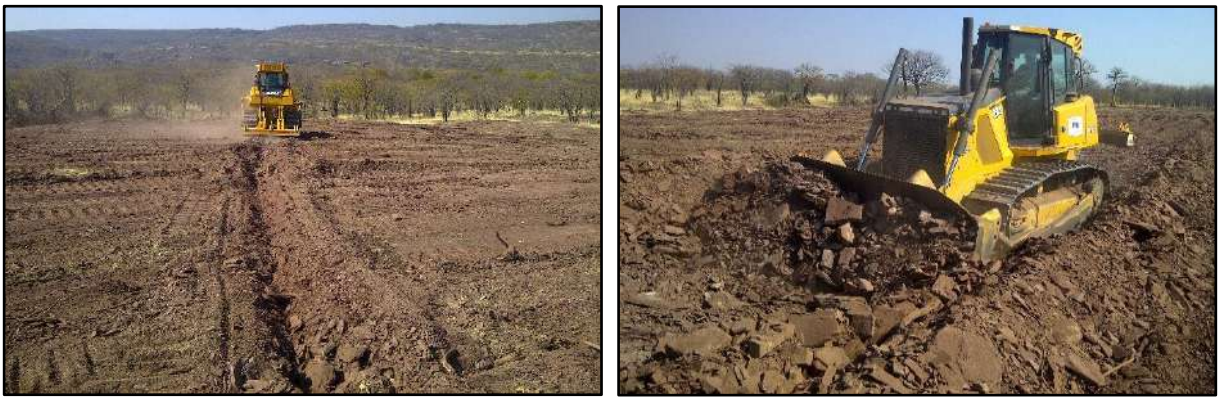

Figure 3: Ripping and Dozing Activities

2.2 LOADING AND HAULING

2.2.1 LOADING

The ripped material is dozed by the bulldozer onto in-pit stockpiles of up to 3 m high and at intervals of about 50 m apart from where it is picked up by an excavator and loaded into tipper trucks for hauling to the brick factory. Two tipper trucks, each with a 20 m^3 payload will be used to haul the materials to the brick factory.

Loading one tipper truck takes about 5 minute while the turnaround time to the brick factory and back is about 40 minutes. Within 60 minutes (1 hour) – the excavator will effectively operate for approximately 10 minutes which equates to a running time of about 80 minutes in a shift of 9 hours.

2.2.2 HAULING

The brick factory is about 18 km away. The turnaround time to the factory is about 40 minutes. According to the promoter, two tipper trucks, each with a payload of 20 m^3, each delivering 10 loads per day will be able to haul ±8 000 m^3 in 20 days which implies that the annual brick clay requirement of 40 000 m^3 can be hauled to the brick factory in about 100 days.

2.2.3 ACCESS ROAD

The quarry is linked to the D3700 tar road by a short access road of about 600 m long. The two trucks used to cart the raw materials to the brick factory are not expected to cause any traffic flow or congestion on the section of D3700.

Figure 4: An excavator loading clay into a tipper truck in the quarry pit

2.3 ACCESSORY WORK

On one of the mining claim – an area of 500 m^2 will be fenced in for the purpose of keeping the operational utilities and accessories, briefly described here underneath. No permanent structures will be erected, at least not within the first five years:

2.3.1 SITE OFFICE

A potable office container will be kept here where files and records pertaining to the operation are kept.

2.3.2 TOILET SYSTEM

One portable chemical toilet will be installed for use during the seven months of quarrying campaigns.

2.3.3 PARKING AREA

The bulldozer and excavator are heavy equipment which need a lowbed to be moved and will be kept at the mining claims during the seven months of quarrying campaign. For security and safety, the machines will be parked on the premises at night and not left on the quarry face. The tipper trucks will be parked at the brick factory.

Routine servicing and maintenance of such machinery will also be carried out on this yard. Only breakdowns will be attended to on working face.

2.3.4 POTABLE WATER:

A tank with a capacity of 2 000 litre will be installed to provide cleaning drinking water during the seven months of quarrying.

2.3.5 ELECTRICITY

Electricity is only required for lighting and security purposes at night and will be provided from a solar panel to be installed on the 500 m^2 yard. No permanent electricity installation is required.

2.3.6 FUEL

No fuel will be kept or stored on the mining claim site. The two machines (bulldozer and excavator) at the quarry will be refuelled from a mobile diesel bowser – 2000 litres. as no fuel will be stored at the mining site. Bulk fuel will only be stored at the brick factory.

2.3.7 WORKING HOURS

Mining, loading and hauling will be performed as follows:

Monday to Friday - from 07h00 to 17h00
Saturday – 08h00 to 13h00

No mining, loading and hauling will be performed during Sundays and on public holidays.

2.3.8 MANPOWER

The following people will be involved in the mining and trucking of raw materials:

- 1 x Quarry Manager /Supervisor
- 1 x Bulldozer operator
- 1 x Excavator operator
- 2 x Tipper truck operators
- 2 x Support personnel
- 3 x Security guards (working shifts only)

3 JUSTIFICATION FOR THE PROJECT

3.1 DEMAND FOR BRICKS

Despite limited building activities, a market study conducted by RCP has indicated that there is strong demand for good quality bricks in the built environments in the urban and peri-urban locations of the northern regions of Omusati, Oshana, Ohangwena, Oshikoto and Kunene. This demand is primarily driven by large scale urbanisation as well as depletion and restrictions placed on sourcing timber from mopane trees, which, for centuries, has been used in the construction of traditional homesteads, palisade and fencing, is the said regions. Bricks are therefore the obvious substitute building materials in the said regions.

3.2 PRESSURE ON SAND RESOURCES

According to a recent study titled: '*Clay Brick in the Southern Africa Development Communities* (SADC), Swisscontact et al 2017, Namibia has the least clay brick manufacturing facilities when compared to its neighbouring countries. The annual domestic brick consumption was estimated at 140 million brick units with clay brick constituting for about 10%. Brick consumption in the northern regions was estimated at about 50 million units per year or 36% of the total national brick consumption - 5% of the estimated 50 million brick consumption is clay bricks.

Cement based bricks are therefore the main building materials used within the target market. The ingredients of cement based bricks are sand, concrete stones, cement and water with sand making up about 80% of the brick mass. The production of cement bricks has therefore placed enormous pressure on the limited sand resources particularly to those resources situated around the main centers of consumption Ondangwa-Ongwediva-Oshakati-Outapi.

The manufacturing of clay bricks promoted by RCP will use 100% shale clay mixed only with minimal water. This initiative is therefore expected, albeit in a small measure, to reduce the pressure on the limited sand resources within the target market.

Figure 5: Man-made structures in the Ruacana Valley

4 REGULATORY REQUIREMENTS

Pieces of legislations that have provisions applicable to this operation are listed in in **Table** below. RCP Management is expected to acquaint themselves with such provisions.

The environmental regulations are guided and implemented by the Environmental Commissioner who heads the Department of Environmental Affairs (DEA) within MEFT. The mining aspects of the operations are guided and implemented by the Minerals (Prospecting and Mining) Act with the Environmental Commissioner as the responsible person.

Table 3: Applicable Policies and Regulations and Policies

Laws & Policies	A	B	C	D	E	F	G	H	I	J	K
The Constitution of Namibia	x	x	x	x	x	x	x	x	x	x	x
Atmospheric Pollution Prevention Ordinance No. 11 of 1976		x	x					x			x
Communal Land Reform Act, 5 of 2002	x	x	x	x	x		x	x	x	x	x
Environmental Management Act , Act 7 of 2007	x	x	x	x	x	x	x	x	x	x	x
EIA Regulations as Gazetted February 2012											
Forestry Act, Act 12 of 2001	x	x		x		x					x
Hazardous Substance Ordinance No. 14 of 1974	x	x	x	x				x	x	x	x
Labour Act No. 6 of 1992 - Health and Safety Regulations		x	x	x	x	x	x	x		x	x
Minerals (Prospecting & Mining) Act, Act 33 of 1992	x									x	
Mines, Works and Minerals Ordinance, No 20 of 1968	x	x	x	x	x		x				x
Petroleum Products and Energy Act, Act 13 of 1990		x	x								x
Pollution Control and Waste Management Bill (Draft, 2003)		x	x	x				x			x
Public and Environmental Health Act No. 86 of 2015		x	x	x	x	x	x	x	x	x	x
Regional Council Act, Act 29 of 1992	x						x	x		x	x
Regulations of the Environmental Management Act	x	x	x	x	x	x	x	x	x	x	x
Road Traffic and Transport Act, No. 22 of 19992		x	x	x	x		x			x	x
Soil Conservation Act, No. 67 of 1969, RSA, as amended		x	x			x	x	x	x		
Traditional Authority Act, Act 20 of 2000	x				x		x	x	x	x	
Water Resource Management Act, Act 11 of 2013	x						x	x		x	x

Legend: Impacts			
A	Use of natural resources	H	Biodiversity
B	Emissions impact (Air & Odour)	I	Archaeological, Cultural and Heritage Impacts
C	Emissions (to land & Hazard)	J	Social-economic Impacts
D	Noisy impacts	K	Health and Safety Impacts
E	Visual impacts		
F	Vibrations		
G	Land use		

5 ROLES AND RESPONSIBILITIES

Various stakeholders – statutory and non-statutory will have different roles and functions to play in the development of the quarrying operation promoted by RCP. In Table 5, below is the list of statutory stakeholders who have direct bearings on the specific project as well as the roles and functions of the persons responsible for ensuring compliance from the promoter side.

Table 4: Roles and Responsibilities of Statutory Stakeholders

Stakeholder	Functions and Responsibilities
The Environmental Commissioner (EC)	The Environmental Management Act (EMA) is implemented by the EC within MEFT. The EC is responsible for ensuring and enforcing compliance with the relevant environmental legislations and regulations of EMA. Amongst the roles and responsibilities of the EC are to : ❖ grant the ECC and renewals thereof; ❖ ensure overall compliance with the provisions of the EMP; ❖ review this document and any revisions thereof; ❖ undertake site audits at their discretion; ❖ review the environmental audit reports; ❖ review any major environmental related incidents/accidents, and ❖ enforce the legal mechanisms for contraventions to the EMP.
The Mining Commissioner	RCP owns nine Mining Claims pegged in terms of the Minerals Act. The Mining Commissioner is responsible for ensuring compliance of the provisions of the Minerals Act. Amongst the roles and responsibilities are to: ❖ grant the MCs, renewal and or refusal thereof; ❖ undertake inspections/visits to the MCs at their discretion; ❖ review annual mining reports submitted by RCP; ❖ levy and collect royalty from mineral rights holders where, applicable, ❖ ensure that high standards of safety and health are upheld and maintained throughout the lifespan of the quarrying operation, and ❖ enforce the legal mechanisms for any contraventions of the Minerals Act pertaining to MCs.
Roads Authority	The Roads Authority was established by an Act of Parliament and, amongst its core functions are to manage the road network in the country by ensuring that safety and a high standard of maintenance is upheld. Amongst the roles and responsibilities of Roads Authority are: ❖ Vehicle registration and licensing; ❖ Roadworthy testing; ❖ Driver testing and licensing; ❖ Issuing of special permits, i.e. transport of heavy machinery such as excavator & bulldozer to MCs; ❖ Road construction, maintenance and rehabilitation; ❖ Road traffic and inspections; ❖ Control overloading and damage to roads by weighing heavy vehicles over 3 500 kg large vehicles;

Table 5: Roles and Functions of the Promoter

Person Responsible	Functions and Responsibilities
RCP Management	The operation has two components – quarrying followed by loading and hauling of the brick clay from the MCs to the brick factory over a distance of 18 km. RCP Management is expected to appoint an experienced and qualified person with the designation of a **Quarry Supervisor (QS)** to take charge of the operational activities at the MCs. Even if the operation is outsourced to a third party, RCP Management will have the overall responsibility in terms of the EMP. The RCP Management has to ensure that: ❖ the necessary environment authorizations and permits are obtained and copies kept in the office; ❖ adequate training on the provisions of the EMP is provided to all prospective employees as well as to any other third party who may be hired to do the mining on behalf of RCP; ❖ compliance is maintained with all applicable legislations, regulations and policies pertaining to its sphere of operation; ❖ open and transparent communication is maintained with all stakeholders and authorities including reporting of any significant environmental incidents and or accidents; and ❖ appointments of a Quarry Manager (QM) and all other employees should be made in accordance with the labour laws.
Quarry Manager (QM)	The Quarry Manager has to perform the following minimum functions: ❖ supervise all the resources (manpower and machinery) allocated to the quarrying activities; ❖ to ensure that the quarrying activities are conducted in a safe and hazardous free environment; ❖ to ensure that the mitigation measures as detailed in the EMP are implemented correctly and effectively for all the activities as outlined; ❖ to ensure that employees involved in the quarrying and hauling of raw materials are provided with suitable PPE; ❖ to hold daily meetings (tool box talk) with the crew to discuss the current operational activities and the health, safety and environmental issues associated with such activities; ❖ to receive visitors to the quarry site and ensure that safety and PPE are worn, and ❖ to address any complainants received from any stakeholders on the quarry activities.
Timing	On a daily basis throughout the seven months when all activities related to the quarrying and hauling of raw materials to the brick factory is underway.

6 LIST OF POTENTIAL IMPACTS

6.1 ACTIVITIES RELATED TO QUARRYING

Quarrying of shale clay will be associated with numerous activities which are likely to have negative impacts on the receiving environment. Outlined in the table 7, below is a list of some of the activities related to quarrying, loading and hauling of shale clay to the brick factory which some 18 km away.

Table 6: List of Activities and Potential Impacts

Activity	Description	Associated Potential Impacts
Preparation of a Campsite at Mining Claims (the Quarry Site)	A campsite is required where to park quarrying machines, equipment, a containerized site office, potable water for drinking, a potable chemical toilet, etc.	❖ Clearing of vegetation; ❖ Loss of habitats; ❖ Dust during excavations; ❖ Waste generation; ❖ Possible contamination of water streams from oil & fuel leaks from machines and equipment; ❖ Possible pollution of groundwater from fuel leaks; ❖ Visual intrusion, and ❖ Potential damage to archaeological and cultural resources during quarrying excavations.
Access roads	An access road from D3700 to the campsite and internal routes are required to link the various Mining Claims.	❖ Clearing of vegetation; ❖ Loss of habitats, and ❖ Dust during the construction and haulage.
Quarrying (First step involves waste removal)	Removal of topsoil and overburden to exposure the shale clay	❖ Loss of topsoil & soil fertility ❖ Loss of habitats ❖ Dust generation from soil handling ❖ Noise pollution from machines ❖ Air emissions/smoke from machines & equipment ❖ Overburden stockpiles (visual impact)
Quarrying (2nd step involves product removal)	Ripping and dozing of shale clay into in-pit stockpiles spaced 50 meters apart	❖ Dust from handling dry shale clay ❖ Noise from machines ❖ Air emission ❖ Product stockpiles (Visual – impact) ❖ Deep pit (danger to livestock)
Stockpiling (In-pit stockpiles of quarried shale clay)	Quarried shale clay is stored in heaps called in-pit stockpiles where the materials could remain for as long as ten months allowing the clay to age in order to improve workability.	❖ Windblown dust from stockpiles; ❖ Erosion of quarried shale from stockpiles; ❖ Visual disturbance if stockpiles are visible from the road;
Loading (from in-pit stockpiles)	The quarried shale clay is loaded by an excavator into tipper trucks.	❖ Fugitive dust pollution ❖ Noise pollution ❖ Air emissions ❖ Rock falling
Hauling	The quarried shale clay is hauled by tipper trucks to the brick factory at the	❖ Dust on access road ❖ Dust from shale clay in tipper trucks

Activity	Description	Associated Potential Impacts
	town of Ruacana about 18 km away. Only 800 m of this road is gravel road.	❖ Noise ❖ Non-compliance with road regulations Overloading ❖ Road accidents/incidents
Refueling	The machines and trucks will have to refueled	❖ Fuel spills ❖ Fuel/oil leakages ❖ Risk of fire hazard ❖ Potential contamination of surface dry water streams & groundwater contamination
Maintenance & Servicing	The machines and equipment used in the quarrying operation have to regularly serviced and maintained	❖ Generation of hazardous waste (used oil, old batteries, scrap metals, etc.) ❖ Potential contamination of surface dry water streams in the valley and groundwater. ❖ Redundant and scrapped machines and equipment becoming eyesores. ❖ Injuries during servicing resulting from poorly trained and inexperienced personnel.
Cleaning of machines & equipment		❖ Waste generation both hazardous and non-hazardous. ❖ Poor handling of fuel stained water discharged into the natural environment. ❖ Potential contamination of natural dry water streams and groundwater in the valley. ❖ Poor waste management causing resulting
Safety and Security aspects around the quarry site	A high standard of safety and security should be maintained at the quarry site	❖ Theft due to poor security at the site. ❖ Vandalism due to lack of security. ❖ Sabotage ❖ Injury from undetonated explosives
People at the Campsite		❖ Noise ❖ Theft ❖ Social issues related to bringing people in a new environment (fighting, alcohol abuse, HIV/AIDs) ❖ Poaching ❖ Firewood harvesting

6.2 MANAGEMENT MEASURES AND RECOMMENDED MITIGATIONS

Successful management measures will be ascertained by how well the proponent avoids, minimizes or mitigates those impacts associated with the quarrying operation. The full suite of the applicant's facilities have been described in the EIA scoping report and are therefore not repeated in this EMP report.

In this section management measures have been proposed to deal with those impacts considered to be associated with the quarrying activities conducted on the Mining Claims held by the applicant, RCP. The measures have been presented in a table format as follows:

- First, the EMP for the particular environmental aspect is presented followed by a brief description of the potential impacts or issues likely to arise from that particular activity.

- Second, a brief description of the environmental objective intended to be achieved is outlined followed by recommended mitigation measures/management measures, the timing when the intervention should be made and the party responsible for ensuring compliance.

6.2.1 EMP ON COMMUNICATION WITH STAKEHOLDERS & IAPS

It is beneficiary to the promoter to develop and to maintain a culture of an open and transparent communication with key stakeholders and IAPs throughout the lifespan of the quarrying operation. An open and transparent approach will help to avoid misunderstandings and instead help to secure the support of the local community.

Table 7: EMP – Communication with Stakeholders & IAPs

MANAGEMENT ENVIRONMENTAL OBJECTIVE:	Ensure that regular communication is provided to stakeholders and that opportunity is provided for IAPs to continue raising any concerns about those aspect of the operation that may be affecting them.		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Identification of Stakeholders	Develop and maintain a registry of both statutory stakeholders and IAPs: ❖ GRN Agencies: MME, MEFT, MAWLR, RA, etc. ❖ Local Police (contact number) ❖ Local Clinic (contact numbers) ❖ Emergency Services (Fire Brigade, etc.) ❖ Service providers: Nored, Namwater, RTC, etc.	Ongoing throughout the project lifespan	RCP Management
Maintain good working Relationships with Stakeholders	❖ Devise and implement a stakeholder communication and engagement strategy where information sharing meetings are held with RTC officials, neighbouring residents & key service providers.	Quarterly during the development stage	RCP Management
	❖ Keep all stakeholders informed about the progress being made with the quarrying operation.	Quarterly during the initial stages	RCP Management
	❖ Comply with reporting requirements of the Mining Claims by submitting reports to MME.	Annually	Quarry Manager
	❖ Comply with the terms of the ECC by providing reports to the office of EC.	Annually	Quarry Manager
	❖ Liaise with Roads Authority to have appropriate road traffic signs installed at the turn off to the quarry.	Prior to starting with quarrying	RCP Management
	❖ Record complaints received from IAPs, investigate such complainants and take corrective actions. Provide feedback where warranted.	When reported	Quarry Manager

6.2.2 EMP ON SOCIO-ECONOMIC ENVIRONMENT

The quarrying operation will create about ten fulltime employment opportunities. However, the beneficiation of raw materials will lead to further employment opportunities at the brick factory estimated at about 100 people.

Additional benefits will accrue to the community through the supply of good quality bricks that will be procured by local building construction companies who in turn will create employment opportunities.

Table 8: EMP on Socio-economic Impacts

MANAGEMENT ENVIRONMENTAL OBJECTIVE:	Optimize benefits to the local community by striving to become a responsible and caring corporation citizen.		
Aspects	**Management Measures /Mitigation**	**Timing**	**Responsible Person**
Enhance positive Economic Impacts:	❖ Source and procure goods required for the quarrying operation from local suppliers: spare parts, fuel, oil lubricants, etc. ❖ Make use of local small-scale contractors for activities such bush clearing, installation of fencing, etc. who are experienced and with good references.	When buying	RCP Management
Recruitment Process or Hiring of Employees	❖ Ensure that employment is offered in compliance with applicable labour laws and regulations.	When hiring	Quarry Manager
	❖ Adopt a 'local first policy' when hiring workers for non-skilled positions by giving preference to the locals.	When hiring	Quarry Manager
	❖ Hire without discrimination on the basis of gender, race, language, background, religion or political affiliations.	When hiring	Quarry Manager
	❖ Give consideration to ❖ person from marginalized communities e.g. OvaHimba who are the natives of the area.	When Hiring	Quarry Manager
Labour & Working Conditions	❖ Conditions of employment must be in writing with a copy kept on file and one copy given to the employee. The contract must state job specifications, working hours, remuneration, etc.	When Hiring	Quarry Manager
	❖ Give all employees an induction on the EMP, housekeeping rules including safety, grievances procedures and company policies.	When Hiring	Quarry Manager
	❖ Allow employees to join and belong to a trade union of their choice. Allow each employee charged with a misconduct the right to be represented during a disciplinary hearing.	Once Hired	RCP Management
	❖ Keep proper records on the number of employees, fulltime/part-time, contractors hired, payments made to contractors, salaries/wages, etc.	From Hiring Date, throughout	Quarry Manager
Employees' Wellbeing	❖ Develop a policy on social ills to deal with aspects related to drug, alcohol abuse, unsafe sex practices, HIV/AIDS, ETC.	At inception	RCP Management
	❖ Provide on-the-job training opportunities to help employees to improve their skills level which ultimately leads to high productivity, reduced wastage, motivation, high morale and efficiencies	Ongoing	Quarry Manager

6.2.3 EMP ON SAFETY, HEALTH AND SECURITY

It is important that safety and security measures are enhanced at the quarrying site to safeguard and to protect the employees, machinery, equipment and any third party who may be visiting the operational site. Access to the quarry site by any person without permission should be prohibited and an emergency response plan for incidents and accidents should be developed and implemented.

Table 9: EMP on Safety, Health & Security

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure that adequate measures are put in place to promote a safe, health and secure working environment, free from physical harm to employees, to any third party who may be visiting the premises and the receiving environment.		
Aspect	**Management And Mitigation Measures**	**Timing**	**Responsible Person**
Access to the Quarry Site	❖ Access to the quarry site should be provided via a single access point manned by a security guard at all times during the quarrying campaigns of seven months. No unauthorized persons are allowed to enter the quarry site unless security cleared.	Establish during the development stage	RCP Management
	❖ Management should assess the need to install a fence around the quarry premises as the quarry gets deeper. Fencing will prevent animals from entering the quarry pit and injuring themselves. The deepest point is expected to be about 14 meters.	Check and assess quarterly	RCP Management
	❖ To operate an alcohol-free quarrying operation, all machine and truck operators should be tested. This also applies to any third party contracted for any work at quarry. Employees with alcohol levels above the norm will be denied access and loose a day's wage.	Daily before 'toolbox talk'	Quarry Manager
	❖ During the layover period of five months (November to March) when no quarrying and hauling take place, safety around the quarry must be maintained.	Monthly during the layover period	Quarry Manager
Safety Measures around the Quarry	❖ An Emergency Response Plan (ERP) must be developed to deal with any emergencies which may arise at the quarry site, i.e. fire outbreak, accidents, slope failure, drainage, quarry pit flooding, etc. Employees should be acquainted with the ERP.	At the inception before quarrying starts	RCP Management
	❖ No employee should be allowed to perform any activity which requires the use of PPEs unless provided with suitable PPEs.	Ongoing during the quarrying	Quarry Manager
	❖ Any spills of hazardous products must be immediately contained and handled as provided for in the ERP. Corrective action must be taken to avoid re-occurrence.	Whenever a spill occurs	Quarry Manager

6.2.4 EMP ON CAMPSITE ESTABLISHMENT & MANAGEMENT

By road, the Mining Claims are located about 20 km and 15 km respectively from Oshifo and Ruacana residential areas township. The brick factory is at the turnoff and along the C35 road to Kamanjab/Opuwo and about 18 km from quarry site. A campsite has to be established at the quarry site where machinery, trucks and equipment are kept during the quarrying campaign of seven months each year.

Projections are that ten people will be employed on a fulltime basis in the quarrying operation. No accommodation will be provided for employees at the quarry site, however, a security guard will be permanently at the campsite during those months when quarrying is being carried out. The campsite will be established on one of the Mining Claims where accessory works will be erected. The footprint of the campsite is expected to cover about 1200 m^2. And has to be fenced in with access provided via a single entry point.

Table 10: EMP on Campsite Establishment & Management

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure that that a harmonious relationship is maintained during work hours at the campsite by encouraging good housekeeping rules and practices.		
Aspects	**Management And Mitigation Measures**	**Timing**	**Responsible Person**
Housekeeping Rules at Camp Site	❖ A campsite on one of the Mining Claims is to be established. A campsite is considered as accessory work and permission for its establishment must be obtained from the Mining Commissioner.	Prior to establishing	QM
	❖ Adequate ablution facilities should be provided in line with the number of employees	Prior starting the operation commencing	QM
	❖ Ablution facilities must not be allocated within 100 m of any stream channel, pond or any surface water.	During establishment	QM
	❖ No employees (except the security guards) are allowed to reside at the campsite.	All the time	QM
	❖ Ensure that adequate fire extinguishers, first aid kit and emergency numbers (police, ambulance, fire brigade, etc.) are provided. must be provided	Check weekly	QM
	❖ All machine servicing and repairs must be done at a designated section of the campsite which is concrete lined and bunded.	All repairs	QM
	❖ No alcohol, drugs, firearms, dangerous knives, etc. must be brought to the campsite.	Daily	QM
	❖ No abuse of resources will be tolerated (water, fuel, toilet papers, etc)	Ongoing	QM
	❖ Stealing of company assets is strictly forbidden and offers will be dismissed.	Ongoing	QM
	❖ No poaching or harvesting of firewood by employees will be tolerated	Ongoing	QM
	❖ Waste both non-hazardous and hazardous at the campsite must be handled in the line with the EMP	Ongoing	QM

6.2.5 EMP ON QUARRYING

Quarrying is the process of extracting shale clay and will inevitably involve activities which disturb the soil profile and could lead to land degradation if not well planned and well managed. The shale clay or brick clay is covered by a thin layer of the topsoil followed by another layer of overburden which have to be removed in the quarrying process.

Table 11: EMP on Quarrying

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure any excavation is preceded by carefully planning and well-demarcated such that minimal land disturbance is made and that management plans are developed to deal with topsoil, overburden and rehabilitation of worked out areas on an ongoing basis		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Land and soil disturbances	Topsoil down to a depth of 300 mm must be stockpiled for future rehabilitation. Topsoil stockpiles should be leveled, contoured and natural grass allowed to grow over the heap. Practical measures should be taken to minimise short and long term soil erosion.	Ongoing throughout	QM
	The quarrying operation should be well planned to ensure that minimal vegetation clearing occurs. Where feasible mature trees should be avoided.	When opening a new site	QM
	Any new quarry route that is required should be well planned and sited away from sensitive areas including natural water streams.	Ongoing	QM
	Areas temporarily disturbed during quarrying or where the brick clay has been extracted should be identified, graded and rehabilitated to improve aesthetics and reduce incident of erosions during the wet season	Ongoing throughout	QM
	Quarried areas should be rehabilitated promptly and not left un-rehabilitated for longer periods.	Ongoing	QM
	Since no quarrying operations are conducted during the wet period, an erosion monitoring procedure should be developed whereby all active quarrying areas and all internal routes are visually monitored prior to and immediately after the rainy season. Erosion gullies and areas requiring repairs and restoration should be fixed.	Check prior to and after the rainy season	QM together RCP Management

6.2.6 EMP ON DUST AND AIR EMISSIONS

Dust will be generated during quarrying (ripping and dozing) activities as well as during the loading into tipper trucks. However, the scale of the operation is very small with only one bulldozer and one excavator in use. Unless ripping, dozing and loading are performed during severe wind conditions, fugitive dust will be minimal.

If traffic movements in and out of the quarry pit is confined to the 600 m access road and a speed limit of 40 km per km maintained, minimal dust should be expected.

Table 12: EMP on Dust and Air Emissions

MANAGEMENT ENVIRONMENTAL OBJECTIVE:	Protect amenity values and human health by striving to operate a dust-free quarry operation		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Air Emissions	❖ Dust from all quarrying activities (ripping, dozing and loading of shale clay) should be minimised. Suspend quarrying activities during severe wind storms.	Check daily during quarrying	QM
	❖ Quarrying and loading of raw materials should be suspended or avoided under high wind conditions or when a visible dust plume is present.	Check daily during hauling	QM
	❖ Employees working in areas where dust levels are higher should be provided with suitable dust masks.	Daily	QM
	❖ A speed limit of 40 km/hr should be enforced when travelling on the access road linking the quarry to D3700 tar road and of 20 km/hr when travelling on all quarry internal routes.	Daily	QM
	❖ Bulldozer, excavator, tipper trucks and LDV used in the quarrying operation should be properly maintained and regularly serviced to reduce gaseous emissions.	Weekly	QM
	❖ Unnecessary idling and revving should be avoided to minimise gaseous emissions.	Daily	QM

6.2.7 EMP ON NOISE DISTURBANCES

The core machines that will be used in the quarrying operation are as listed in Table 2. The combined noise levels generated by these machines is far less than the environmental noise levels generated by the waterfalls which is about 4.5 km NE of the quarry. WHO recommends noise levels to be maintained below 70 dBA over a 24 hour period (or 75 dBA over an 8-hour period) to prevent noise-induced hearing loss.

Table 13: EMP on Noise Disturbances

MANAGEMENT ENVIRONMENTAL OBJECTIVE:	Protect amenity values, operational and business efficiency by ensuring that noise levels are kept within acceptable parameters.		
Aspect	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Noise pollution	❖ Limit quarry working hours to day-time hours only, i.e. from 07h00 to 17h00, Monday to Friday, and from 08h00 to 13h00 on Saturdays.	Ongoing	QM
	❖ All diesel-powered machinery should be well maintained and routinely serviced and defective silencers replaced.	Ongoing	QM
	❖ Machinery that are used intermittently (excavator) should be shut down between work period or throttled down to a minimum and not left running unnecessarily. This practice will reduce noise and at the same time conserve fuel.	Ongoing	QM
	❖ Tipper truck operators should be trained to position the trucks to the excavator for loading without reversing in order to avoid the activation of disturbing but necessary reverse warning.	Ongoing	QM
	❖ Place stockpiles of overburden on the lowest section of the quarry (west and northwest) to minimise the transmission of noise to the D3700 tar road used by the public. Overburden will be used for quarry rehabilitation in future.	Ongoing	QM
	❖ Provide employees with suitable PPEs and, where warranted, enforce wearing of such devices.	Ongoing	QM

6.2.8 EMP ON WASTE HANDLING AND DISPOSAL

Waste at the quarry site is limited to general household waste (plastics, food items, etc.) and Hazardous waste (spilled oil, used filters, etc.). Given the scale of the operation (maximum of ten people on site) and quarrying campaigns limited to seven months each year, minimal waste will be generated. Impacts associated with poor handling are odour, health hazard, amenity nuisance and visual nuisance.

Table 14: EMP on Waste Handling and Disposal

MANAGEMENT ENVIRONMENTAL OBJECTIVE:	Management should strive to enhance and to protect amenity values by promoting a hygienic and waste-free working environment.		
Aspect	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Impacts of amenity, odour and visual nuisance nature	❖ A waste management plan should be developed for the quarry and all employees trained on such a plan.	Prior to quarrying	RCP Management
	❖ Adequate waste bins should be provided and placed at the quarry site office for temporary storage of different	Dispose at least once weekly	RCP Management
	❖ Any bin in which food items are discarded should have lids to ensure scavengers and wildlife do not gain access to waste food.	Check daily	QM
	❖ Used oil, filters, fuel soaked soil, batteries, etc. should be placed a in leak-proof container and brought to the brick factory on the **same date** and stored at the brick factory for disposal in a responsible manner together with all other hazardous waste.	Remove daily	QM
	❖ No waste must be buried or burned at the Mining Claims. All waste must be disposed of in a responsible and safe manner.	Check and discuss weekly	QM

6.2.9 EMP ON SURFACE AND GROUNDWATER CONTAMINATION

On average, the project area receives about 400 mm of rainfall per annum with all precipitation occurring between layover period of November through to March. It is important that the natural drainage streams running through the valley are kept open and not covered during the quarrying activities.

Any rainwater collected in the quarry pit, should not be discharged into the natural environment or into any dry streams in the valley unless written approval to do so has been granted by the line ministry.

Table 15: EMP for Surface and Groundwater Resources

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure that the quarrying and hauling activities do not cause pollution and contamination of surface and groundwater.		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Dirty water, erosion control, hydrocarbon handling, etc.	❖ Develop a storm water management plan for the quarry operation which provides for clean and dirty water not mix.	At the inception of quarrying activities	RCP Management
	❖ The plan should provide for dirty water from quarry surface flows to be deflected by berms and directed into sump ponds suitably constructed on the lowest section of the quarry pit.	Monitor weekly during the rainy season	Quarry Manger
	❖ Water from the sump ponds and any section of the quarry pit area should not be discharged into the natural environment unless written permission is granted by the line ministry.	Check during the rainy period	Quarry Manager
	❖ Develop suitable erosion protection measures around those areas of the quarry pit that appear prone and susceptible to erosion.	Check yearly before and after the rainy season	Quarry Manager
	❖ Any area where hydrocarbon is handled, i.e. servicing, repairing and refueling of machines should have impervious floors with adequate protective bunds to ensure that any fuel spills or leaks is captured.	Check daily and clean up immediately when a spill occurs	Quarry Manager
	❖ No quarrying should take place in any area identified as “No-Go” areas, which must be cordoned off during quarrying operations.	Check weekly during quarrying	Quarry Manager
	❖ Prevent or minimise potential pollution of surface water as a result of insufficient and poorly maintenance of the onsite ablution facility at campsite.	At installation, check weekly during quarrying	Quarry Manager

6.2.10 EMP ON FUEL STORAGE & HANDLING

Given that only two machines (a bulldozer and an excavator) will be stationed at the site during the quarrying campaign of seven months each year – no fuel storage facility will be allowed on site. Refueling of such machines should be done from a suitable diesel bowser with a capacity not exceeding 3 000 liters.

The bowser should be licensed and signposted - ‘Danger’ ‘No Smoking’ & ‘No naked Flame’ and supplied with a suitable fire extinguisher.

Table 16: EMP on Fuel Storage and Handling

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Protect amenity values, operational and business efficiency by ensuring that any adverse impacts from fuel storage and handling are minimised.		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Leakage (leading groundwater contamination) **Fire hazards** **Safety hazard**	❖ No storage of bulk fuel is allowed at the quarry site. Refueling for the two earthmoving machines should be done by means a diesel bower as described above. of earthmoving	Review quarrying fuel requirements after three years	RCP Management

6.2.11 EMP ON TRAFFIC IMPACTS

The quarry site is situated in the Ruacana Valley and linked to D3700 tar road by a short access road of about 600 m. During the quarrying campaign, two tipper trucks will be used to haul the brick clay from the Mining Claims to the brick factory which is 18 km away – at the turnoff to Kamanjab-Opuwo-Outjo.

On average, two tipper tricks will be used making about 20 trips per day or ±2 000 trips over the seven months of quarrying campaign. The transport will not result in traffic congestion on D3700.

Table 17: EMP on Traffic Impacts on Public Roads

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure that road traffic regulations are maintained and safeguarded at all times.		
Aspect	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Overloading, damage to public road, spills on roads, over speeding, incidents and accidents	❖ Liaise with RA to have suitable traffic signs installed along D3700 to warn motorists approaching the section where the access road intersects D3700 of heavy vehicles (tipper trucks) entering and turning onto D3700 from the quarry site.	At the beginning of quarrying	RCP Management
	❖ The last 200 m of the access road linking onto D3700 should be spread with gravel to prevent trucks entering D3700 from bringing dust contaminants onto the public road.	At the beginning of the quarrying	RCP Management
	❖ All company vehicles and LDVs must be licensed and roadworthy and operated by licensed drivers with valid public permits.	At all times	QM
	❖ Drivers of tipper trucks must stick to the speed limit. No over speeding is allowed and drivers found over speeding must be reprimanded.	Daily during hauling	QM
	❖ The brick clay is generally dump, and no dust is expected to be blown out en route to the factory. If it is discovered that fugitive dust escapes, tippers should be covered with suitable tarpaulin covers.	Whenever dust	QM
	❖ Any complaints received with respect to road traffic regulations should be recorded, immediately investigated and corrective action taken.	When reported	QM

6.2.12 EMP ON BIODIVERSITY

Biodiversity is best understood and appreciated when one considers its components which consist of plant species and animals as well as the different habitats in which they live (biodiversity patterns). It is also important to appreciate how important factors, such as wind, water, presence of pollinators affect the habitats and the species living in them (ecosystem process).

The nine Mining Claims held by RCP have a surface area of approximately 162 ha, however, the brick clay deposit is on land measuring about 80 ha – the actual quarrying activity will therefore be confined to a footprint of 80% of this land.

It should be noted that the Ruacana Valley is not a pristine location. Major national infrastructure in the form road (D3700), the hydropower plant (built between 1977 and 1978), overhead transmission power lines and an overland water pipeline are running through the valley (Fig. 6).

Table 18: EMP on Biodiversity

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Maintain and upheld existing biodiversity by ensuring that the minimal negative impacts are caused on the existing ecosystem.		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Flora and fauna	❖ Plan and site the access road, the campsite and all internal quarry routes in a manner that results in minimal removal of plants and trees.	During the planning stage	RCP Management
	❖ All quarrying activities should take place in areas that are well planned and clearly demarcated so as to minimise vegetation and plant clearance. Any sensitive areas should be avoided.	During quarrying activities	QM
	❖ The campsite for the quarry operation must be fenced in to prevent any livestock in the area entering the premises resulting in injuries and causing damages to assets and goods.	During the planning stage	QM
	❖ Open fire must be avoided, alternatively fire should be made at a dedicated area and under direct supervision at all times	Ongoing	QM
	❖ Ensure that the campsite is kept clean and free of rubbish that could potentially attract wild animals and pests to the campsite.	Daily	QM
	❖ Harvesting of trees for firewood or for any other use without permission from the line ministry is prohibited.	Ongoing	QM
	❖ Any birds that may be nestling in trees on the premises should be not be disturbed.	Ongoing	QM
	❖ Killings of reptiles (snakes and scorpions) is forbidden except where such reptiles pose a danger to the lives of people.	Ongoing	QM
	❖ There are no large wild fauna remnants in the valley. Smaller wild fauna such as insects and reptiles that can be disturbed during quarrying activities are likely to relocate and will also naturally re-enter the area post-quarrying.	Ongoing	QM
	❖ No domestic animals may be kept at the campsite as they could introduce disease and interbreed with animals occurring naturally in the area.	Ongoing	QM
	❖ Poaching or capturing of any animals (wild and domestic) is prohibited.	Ongoing	QM

6.2.13 EMP ON VISUAL INTRUSION

The mining claims are in the Ruacana Valley an area whose landscape characters and surroundings has been altered by the construction of infrastructure in the form of roads (D3700), the hydropower plant, an overland water pipeline, overhead transmission power lines and communication towers (Fig. 6). The installation of this infrastructure has therefore impacted and altered the visual resource in the valley.

Table 19: EMP on Visual Intrusion

MANAGEMENT ENVIRONMENTAL OBJECTIVE	Ensure that measures are put in place to limit the visual impacts of the quarrying operation.		
Aspects	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Machines in the quarry pit, Raw materials stockpiles Airborne dust particles	❖ Locate and site infrastructure away from sensitive and elevated areas.	Development stage	QM
	❖ Place overburden stockpiles on the lowest section of quarry pit (to the west and northwest) to reduce visual impacts.	Throughout the operation stage	QM
	❖ Keep stockpiles of raw materials in the quarry pit as low as possible in order to reduce visual nuisance and possible wind erosion. Spraying stockpiles with minimal water can prevent dust escaping from such stockpiles into the atmosphere becoming a visual annoyance to the public using the adjacent roads	Throughout the operation	QM
	❖ Windblown papers and plastics around the factory premises should be regularly picked up to avoid visual nuisance.	Monthly	QM
	❖ Light areas where movements occur such as pathways and internal routes with low level light and avoid post top lighting.	Ongoing	QM
	❖ Any security light installed at the campsite should direct light inwards and not outwards to D3700 and surroundings.	Ongoing	QM

6.2.14 EMP ON ARCHAEOLOGICAL AND CULTURAL NATURE

While no heritage sites are known to occur in the Ruacana Valley, several items of military armaments were observed in the area during the extraction of a pilot testing sample. It is therefore possible that sites or items of heritage significance may be found during the quarry activities. It is important that employees are sensitized on such devices and to help them to recognize heritage 'chance finds' in the course of their work. The chance find procedure is intended to ensure compliance with the relevant provisions of the National Heritage Act (Act No. 27 of 2004), especially section 55(4) which reads as follows:

'a person who discovers any archaeological object must as soon as practicable report the discovery to the Council'.

The reporting procedure as set out below must be observed so that heritage remains identified in the field are reported to the NHC.

Table 20: EMP on Archaeological and Cultural Heritage Resources

Environmental Management Objective	Any findings of archaeological or cultural heritage nature should be safeguarded and protected until directives are received from the NHC on what to do.		
Aspect/Issue	**Management and Mitigation Measures**	**Timing**	**Responsible Person**
Chance find procedure undetonated landmines Impact to archaeological items	Train employees involved in the quarrying operation on the 'chance find' procedure to be followed from the discovery of a heritage site or item, to the necessary investigation and subsequent assessment by an archaeologist or any other qualified person:	Prior to starting with quarrying	RCP Management
	Action by the individual who discovers an archaeological site or item: ❖ If operating a machine, stop work immediately. ❖ Mark the site with flag tapes. ❖ Determine GPS reading if possible. ❖ Report findings to Quarry Manager. <u>Action by the Quarry Manager</u> ❖ Visit site and ascertain if work can continue without any damage to the findings. ❖ Determine and mark exclusion boundary ❖ Site location and details to be added to the project GIS for field confirmation by an archaeologist. <u>Action by archaeologist</u> ❖ Inspect site and confirm addition to project GIS. ❖ Advise NHC and request written permission to remove findings from the working area. ❖ Recovery, packaging and labelling of finding for transfer to National Museum.	When such items are found	Quarry Manager and RCP Management
	Action by an archaeologist ❖ Inspect site and confirm addition to project GIS. ❖ Advise NHC and request written permission to remove findings from the working area. ❖ Recover, package and label the findings for transfer to National Museum.	Whenever such items are found	RCP Management
	If discovery is human remains proceed as follows: ❖ Actions as above. ❖ Field inspections by archaeologist to confirm that remain is human. ❖ Advise and liaise with NHC and NamPol.	Whenever such items are found	RCP Management

7 ENVIRONMENTAL EMERGENCY PROCEDURES, MONITORING & REPORTING

The following procedures are recommended:

7.1 SEWAGE OR WASTE WATER SPILLS

Should leaks be detected in the onsite sewerage or waste water system, the following actions will be taken.

- ❖ The spillage will be contained and the resource turned off if possible. Depending on the amount of spillage, it will be remediated in situ or in the case of a large spillage that is contained, it will be removed.

- ❖ The reason for the spillage will be rectified.

7.2 HYDROCARBON OR CHEMICAL SPILLS

The objective is to contain and remediate spillages of hydrocarbon nature such as diesel, oil, etc.

- ❖ The machine operator must immediately contact the QM
- ❖ The spillage must be contained and the source immediately turned off
- ❖ A team must be organized to assist with cleaning up.
- ❖ The spilled area must be demarcated where applicable
- ❖ The spill kit must be brought to the area
- ❖ Scoop up the spilled substance along with contaminated soil or any absorbent materials using the spill kit shovel.
- ❖ Place the scooped up substance into plastic bags
- ❖ The waste bags should be marked as hazardous waste and disposed of as hazardous waste.
- ❖ The leakage should be stopped and the reason for spill rectified.

7.3 MONITORING AND REPORTING

Given the scale and scope of the quarrying operation and taking into account that quarrying and hauling of the raw materials will be performed over seven months each year, it is recommended for RCP Management to pay specific attention to these environmental aspects:

- Dust pollution/ Air quality;
- Soil erosion;
- Quarry pit slope stability;
- Security and safety around the quarry pit, and
- Contamination of surface water.

It is recommended that reports on those parameters be prepared at the end of each quarrying campaign. Visual monitoring on quarry slope stability as well as safety and security should be done during the quarrying operation as the pit expands and gets deeper while erosion inspection should be done before the onset of the wet season, throughout the wet season and soon thereafter.

7.3.1 MONITORING PARAMETERS

A simplified environmental monitoring performance indicators has been added to the EMP and is intended to assist RCP Management in early detection of environmental impacts, and to take corrective actions timely and where deemed necessary, as well as to report such impacts to the authorities.

Table 21: Monitoring Performance

Environmental Aspects & Mitigation Measures		Compliance	By Whom	Date Completed
1.	**Land and Soil Disturbances**			
1.1	Were there any deviations from the EMP on aspects related to land & soil?			
1.2	Was any virgin land been cleared of vegetation for quarrying?			
1.3	How big is the land cleared or planned to be cleared?			
1.4	Was the area cleared properly planned, surveyed and clearly demarcated?			
1.5	Have the access routes to the new area been planned and clearly demarcated?			
1.6	Were there any sensitive habitats in the area earmarked for clearing?			
2.	**Solid Waste Disposal (Household waste, office, etc.)**			
2.1	Were there any deviations from the provisions contained in the EMP on the handling and disposal of solid waste?			
2.2	Are the recommended measures in the EMP adequate to deal with the solid waste generated by the operation?			
3.	**Spillage of Hazardous Waste**			
3.1	Were there any deviations from the provisions in the EMP on how to handle hazardous products?			
3.2	Are steel drums provided in good conditions to prevent any leaks of oil from such drums?			
3.3	Have the employees been trained on the procedure to contain any spills that may occur?			
4.	**Dust Impacts on Air Quality**			
4.1	Were there any deviations from the provisions in the EMP on dust mitigation measures?			
4.2	Has any complaint been received with respect to dust generated by the operation by any stakeholder?			
4.4	Were topsoil and overburden stockpiles separated and sited away from natural water channels?			
5.	**Noise Impacts**			
5.1	Were there any deviations from the provisions of the EMP on noise impacts?			
5.3	Was any complaint received on noise levels from any stakeholder?			
6.	**Landscapes and Visual Intrusions**			
6.1	Are there any deviations from the provisions of the EMP with respect to landscape and visual impact mitigation measures?			
6.2	Is a high standard of housekeeping being maintained, i.e. are plastics and papers around the premises regularly picked up?			
7.	**Surface Water, Drainage and Ground Water**			

Environmental Aspects & Mitigation Measures		Compliance	By Whom	Date Completed
7.1	Are there any deviations from the provisions of the EMP with respect to surface water, drainage and groundwater?			
7.2	Are areas which suffered soil erosion during the rainy season, inspected and corrective measures taken to prevent further erosions?			
8.	**Traffic Impact on National Roads**			
8.1	Are there any deviations from the provisions of the EMP on traffic impacts on national roads?			
8.2	Has the RFA been consulted to install suitable road signs to warn motorists approaching the access road leading to the quarry site?			
8.3	Are road regulations complied with, i.e. are vehicles used on public roads licensed, roadworthy and operated by licensed drivers?			
8.4	Are trucks loaded to the required payloads and are the materials correctly loaded without any spills?			
8.5	Was any complainant received from any stakeholders regarding traffic violations?			
9.	**Biodiversity (Fauna and Flora)**			
9.1	Are there any deviations from the provisions of the EMP on biodiversity?			
9.2	Is land clearing being kept to the minimum possible area required for shale clay quarrying? Is such land clearing preceded by careful planning of access routes and areas where to site topsoil and products?			
9.3	Are employees trained to preserve all forms of life during land clearing and quarrying activities?			
9.6	Has any complaint been received with respect to violation of biodiversity?			
10.	**Aspects Related to Archaeological and Cultural Interests**			
10.1	Are there any deviations to the provisions of the EMP with respect to archaeological and cultural matters?			
10.2	Have employees received training on issues related to archaeological and cultural interests?			
10.3	Have employees been informed on what to do in the event of an item of cultural or archaeological interest unearthed during the quarrying operations?			

7.3.2 Environmental Code of Conduct

To improve its overall environmental compliance measures, a set of **Environmental Code of Conduct** are recommended for RCP Management and presented in Table 23, below: All employees should be given an induction which covers the code of conducts for the environment. Clients visiting the quarrying premises, contractors hired to perform certain functions at the quarry as well as any visitors entering the processing facility are expected to be made aware of such code of conduct.

In terms of this Environmental Code of Conduct, the Quarry Manager is authorized to issue warning and to discipline any person who transgresses environmental rules and regulations.

Table 22: Environmental Code of Conduct

HEALTH AND SAFETY GUIDELINES
Restricted Areas: • Do not enter an area marked as restricted or demarcated as dangerous without permission. • Areas that are out of bound or fenced in should not be entered, i.e. fuel storage area. • Do not enter an area marked 'PPE required' unless wearing suitable PPE. **Housekeeping Rules:** • The use of drugs while on duty (at the quarry and brick factory) is strictly forbidden. • Coming to work while intoxicated is not strictly forbidden. • Willful lettering is not allowed and offenders should be reprimanded.

- Possession of guns and dangerous weapons at work (quarry site and brick factory) is not allowed.
- Not wearing clean and tide PPEs is strictly forbidden.

Urinating anywhere other than at designated places on the premises is not allowed.

FAUNAL AND FLORAL MANAGEMENT GUIDELINES

Faunal Guidelines:

- No feeding, hunting, killing or setting devices to trap wild animals (including birds, reptiles and mammals) and livestock is allowed.
- No food items should be left around to attract animals, birds and or insects. Leftover food items must be placed in waste bin with lids such that animals do not gain access.
- Feeding wildlife (e.g. baboons) should be discouraged as it leads to conflict situations between wildlife and humans.
- When clearing land for quarrying purposes, any sensitive habitats where animals are breeding should be avoided.

Floral Guidelines:

- No cutting or harvesting of any plants and or trees for whatever purposes is allowed. Dead trees within the quarry premises maybe collected for firewood.
- Trees in which birds are nestling must be avoided and not uprooted. Any bird nestling must not be disturbed.
- Internal routes should not be sited over sensitive habitats for plants.

GUIDANCE WITH RESPECT TO DISPOSAL OF SOLID AND LIQUID WASTE

- Train employees on the various types of waste: general waste and hazardous waste.
- Train employees on how to identify waste bins, drums or bags for the different types of waste.
- Train employees not to dispose hazardous waste in the bins or skips intended for general waste.
- Educate employees to appreciate the importance of not littering or throwing away waste anywhere on the quarry and factory premises, not to throw waste in the field or along the roads.
- Under no circumstances should waste be buried on site.
- Waste in bins should be disposed of at regular intervals and the bins cleaned and the surrounds kept clean and tidy.

GUIDELINES WITH RESPECT HAZARDOUS WASTE

- Hazardous substances such as oil, fuel, solvents, chemicals, etc. should not be discharged into natural water streams or buried on the premises.
- Any accidental spills of hazardous substances must be immediately contained and corrective action taken. All hazardous spills must be reported to the Quarry Manager.
- Under no circumstances may hazardous substance waste be allowed to soak into the soil on the quarry or factory premises.
- Any leaks or spillage of hazardous substances, unhygienic conditions at the ablution facilities must be immediately reported and corrective measures taken

GUIDELINES WITH RESPECT TO ENVIRONMENTAL RELATED COMPLAINANTS

- Any complaint reported by any stakeholder with respect to working conditions, noise, dust, violations of road regulations by truck operators, pollution or any other harmful or dangerous condition must be recorded, investigated and corrective action taken.
- Where warranted, feedback should be provided to the complainant.

8 DECOMMISSIONING

The shale clay is required for the manufacturing of clay bricks which is an investment running into millions of Namibia Dollars and expected to supply good quality bricks to end users for over 50 years into the future. At the extraction rate of 40 000 m^3 (about 60 000 tons) per year, the shale clay resource is destined to have a lifespan in excess of 50 years. With the national housing shortage estimated at 300 000 units (*Derek Klazen, Deputy Minister, Urban and Rural Development, published in The Namibian newspaper of 21 September 2020*), the likelihood of the clay brick factory ceasing operation within 30 years is remote and highly unlikely.

The fact that the ECC is only valid for three years, there is no provision made in this EMP for decommissioning. Should closure and decommissioning of the shale clay quarry be contemplated, a suitable decommissioning plan will have to be drawn up and meticulously followed according to the highest standards of environmental management best practices. The objective for closure would be to return the quarry as closely as possible to the pre-quarrying condition with quarry pit possible used a fish rearing pond.

Measures will be taken to prevent soil erosion and provide protection so that plants and vegetation can re-colonise. A site assessment will be carried out after closure to ensure that no structures remain and that site rehabilitation has been fully achieved.

9 RECOMMENDATION

Ekwao is confident that the management measures outlined in this EMP to mitigate the environmental impacts associated with the quarrying of shale clay and the transport of such materials to the brick factory at Ruacana are more than adequate, and if implemented will result in minimal impacts to the receiving environment.

It is recommended that an ECC be granted to Ruacana Clay Products for the quarrying of shale clay from its Mining Claims.