

**DARESA INVESTMENT LIMITED P.O.BOX984,  
DAR ES SALAAM, TANZANIA.**

**BUSINESS PROPOSAL FOR COAL PROJECT AT  
MUHUKURU COALFIELD, SONGEA RURAL DISTRICT,  
RUVUMA REGION**

**APRIL, 2023**

## CHAPTER 1

### 1. Business Information

- **Business Name: DARESA INVESTMENT LIMITED**
- **Business Address: Kidole Street, Msongola ward  
P.O.Box 984, Postal code 12114, Plot number P22199.  
Dar es Salaam, Tanzania.**
- **Email: daresaltd1@gmail.com**
- **Website: www.daresainvestment.co.tz**
- **Tel: 255-222-111-944/+255 716-664-715**
- **Permanent Employees: 23**
- **Casual Laborers ;37**
- **Primary Line of Business: Mining and Processing Sector.**

## **2. COMPANY OVERVIEW**

**DARESA INVESTMENT LTD** is considered as a diversified supplier of coal and leading coal mining company that specializes in the exploration, extraction, processing and distribution of coal for energy generation purposes. The company operates coal mines in KAROO BELT southern Tanzania, Songea rural, Ruvuma region place called Muhukuru coalfields near to Muhukuru River, This area is estimated to have around 5.5 million tones reserve which produce high-quality coal products with highly volatile BITUMINOUS COAL with fair ash and low Sulphur content that suitable to be sold to power plants, industrial manufacturers, and other energy companies. We also export coal products.

DARESA INVESTMENT LTD'S objective is to establish an economically viable coal mineral recovery operation using modern methods of mining and applying modern standards of occupational health, safety and environmental care. Planned production is about 1,500 tons per day, 45,000 tons per month and 540,000tons of coal annually. Resources to be mined on an opencast basis will make the Life of Mine (LOM) to be 10 years until deposit depletion.

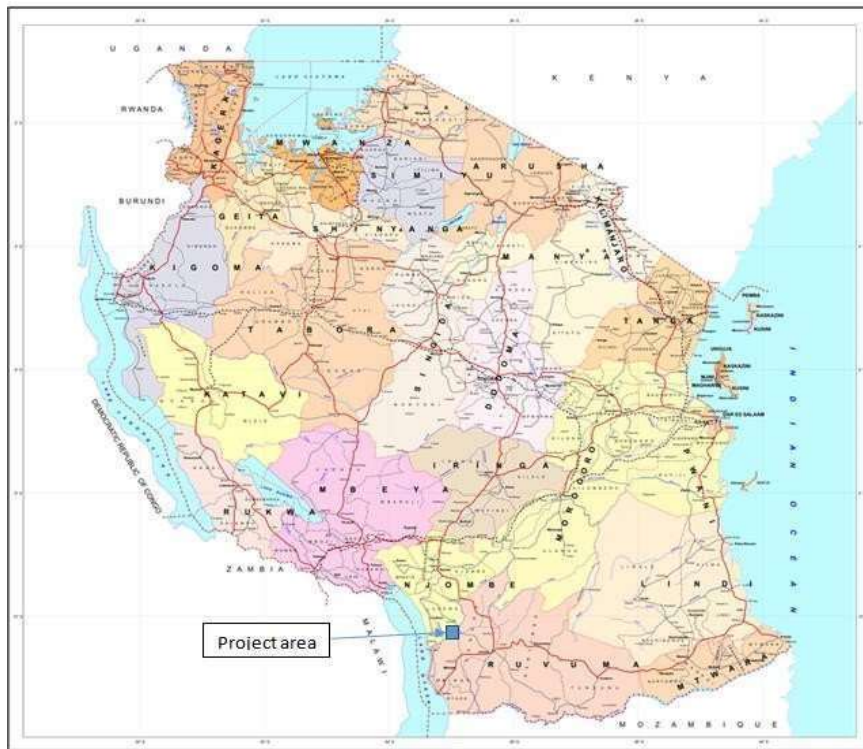
### **2.1Background and Development**

DARESA INVESTMENT LTD was founded in 2023. The company offices is located in Tanzania commercial city hub of Dar es salaam and company's mine site is located in a rural area placed called Songea district Karoo belt at Muhukuru coalfields of the state and had an initial production capacity of 540,000tons per year. Since then, the company has expanded its operations and now operates several mines across different regions. The market opportunities for coal are high due to the economy dependence. Mining coal for commercial basis began with the requirement of minerals for export as a result of large production in the Tanzanian metal industry. In 2022, the shipments

(export) of coal were estimated to be \$141.6 million (Tsh 325.6 billion), which ten times that value was exported in the corresponding period in 2021 at \$13.2 million (Tsh30.3 billion).(According to Bank of Tanzania).

### 3. Location and Accessibility of the project area

The project area is situated in the rural areas of Songea District in Ruvuma Region which is among the Southern Highlands of Tanzania. It is within 20 km from Mozambique boarder town called Mitomoni .



*Figure 1: Location and Accessibility of project area*

**4. Mining:** Mining will be carried out via open pit utilizing excavators and haul trucks fleet. The mined waste will be dumped in designed waste dump according to Environmental Management Plan (EMP). The stripping ratio (waste: coal) is estimated at 2:1. For this project it is expected that the mine will operate 300 days per year.

## **5. Economic Analysis:**

Based on a schedule of operating two shifts per day for the mine in 400 hours per month, the project has indicated great potential to generate positive cash flow over the entire initial 5 years of the life of mine according to resource estimated (Table 1). Cost estimation for the first year of operation for the project is estimated to be US\$ 5,588,400

- The project is expected to generate annual revenue of US\$ 18.9 million;
- The project is likely to produce an annual profit of US\$ 3 million;
- At IRR 15% the project has NPV of 32.4 million for initial period of 3 years.

***Table 1: Important Economic Indicators of the Project***

<b>No.</b>	<b>Economic Indicator</b>	<b>Value</b>
1	Net Present Value (NPV) of the Project	US\$ 35,411,170
2	Internal Rate of Return (IRR)	15%
3	Payback period	3 years
5	Capital costs of the Project	US\$ 12,050,000
6	Operating costs annually	US\$ 1,588,400
7	Price of coal per ton	US\$ 42
8	Life of mine	10 years

The EIA issues associated with development of the Coal Project has been addressed in the EIA report. Risk management, mitigation measures and Environmental Management Plan (EMP) have been also considered. It is therefore, apparent that investment into coal project is viable undertakings that will benefit both DARESA INVESTMENT LIMITED and the Tanzanian nation as a whole through royalty and other taxes. Similarly, the new project will provide creation of employment opportunities and development of other secondary economic activities in the vicinity of the project, particularly the rural Songea District which is in need of development projects to reduce poverty in the area.

## 6. Products

The Company offers a wide range of coal products;

- **Bituminous & Sub-Bituminous Coal:** We'll provide bituminous and sub-bituminous coals that are mainly used in power industries to produce electricity.
- **Metallurgical Coal:** We'll provide metallurgical coal that is primarily used in making steel.
- **Anthracite:** We'll sell anthracite, highest quality coal used for residential and commercial purposes.
- **Other Residues:** Other residues left after processing raw coal such as silica, coal gas will also be sold by us.

They produce coal products in various sizes and specifications to meet the specific needs of their customers. The company also provides processing services, such as coal washing and crushing, to improve the quality and purity of their coal products. Additionally, DARESA Company provides logistics and transportation services to ensure the timely delivery of their coal products to customers.

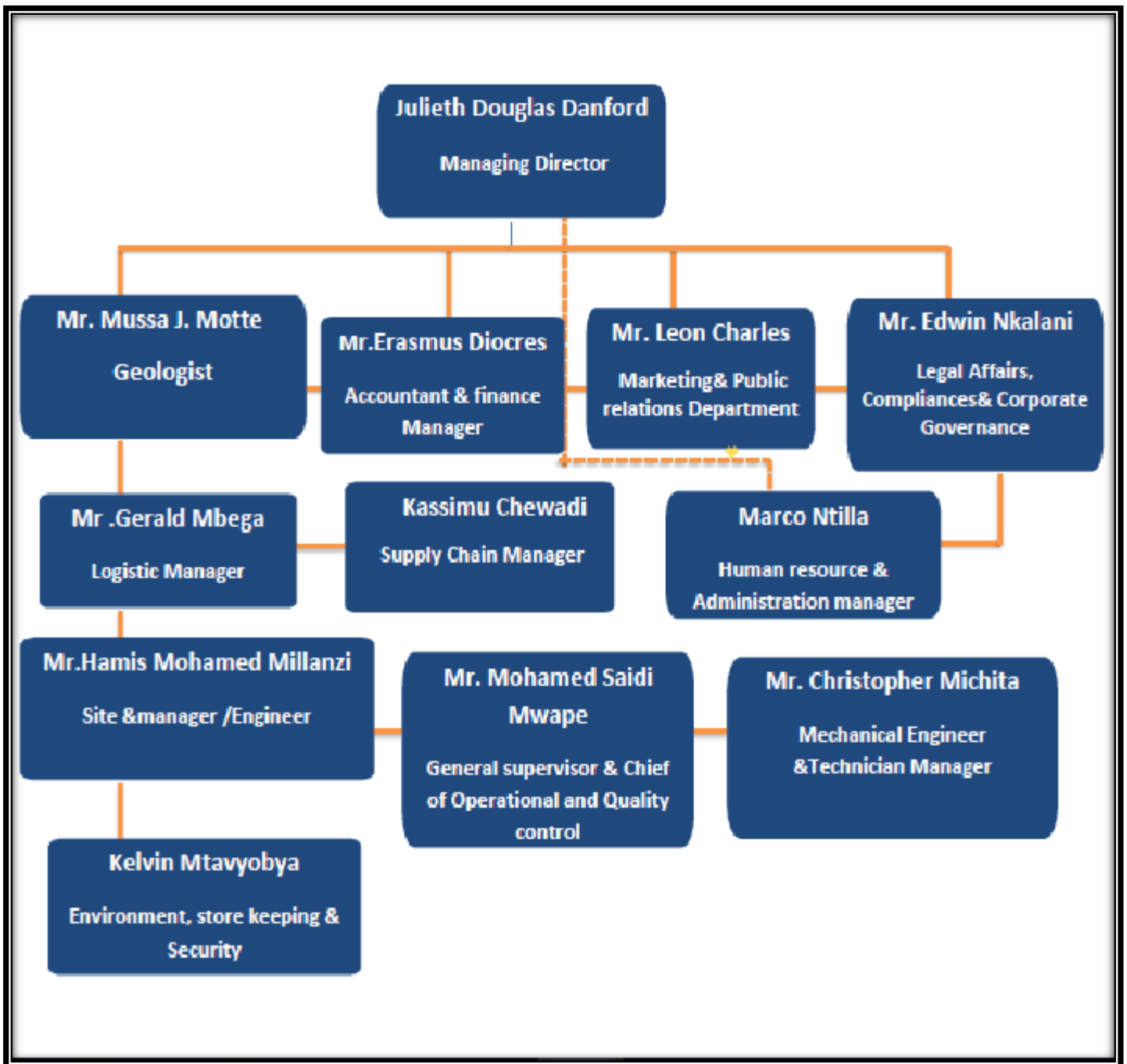
## 7. Company Strategy

- **Purpose:** To be a leader in the mining and coal industry by providing enhanced services, relationship and profitability.
- **Vision:** To provide quality services and products that exceeds the expectations of our esteemed customers.
- **Mission statement:** To build long term relationships with our customers and clients by providing exceptional customer services when pursuing business through innovation and advanced technology.
- **Core values:** We believe in treating our customers with respect and faith. Growth can be through creativity, invention and innovation so that it can integrate honesty, integrity and business ethics into all aspects of our business functions.
- **Goals:** Regional expansion in the field of small scale mining and develop a strong base of key customers to increase the assets and investments of the company to support developmental services. Thus building good reputation in the field of coal extraction and mineral processing hence being a key player in the industry.

## 8. LIST OF ACRONOMY/ABREVIATION

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
IRR	Internal Rate of Return
LOM	Life of Mine
ML	Mining License
NE	North East
NPV	Net Present Value
PML	Primary Mining License
MIL	Market Insight Limited
ROM	Run of Mine
TANESCO	Tanzania Electric Supply Company
O	
TMAA	Tanzania Mineral Audit Agency
TSF	Tailing Storage Facility
US	United State
USA	United State of America
USD	United State Dollar
VEO	Village Executive Officer
WRD	Waste Rock Dump

## DARESA ORGANIZATION BOARD STRUCTURE



## **9. Topography, Climate and Vegetation**

The property area is characterized by the same weather conditions and its topography is almost dominated by hilly with broad, relatively flat basin, ranging from 600 to 700 m above at sea level. The climate is of the tropical savannah type (typical AW according to Koeppen's classification) but, owing to the elevation of 900 (+) meters at sea level, is equitable for the greater part of the year, maximum day temperatures are between 85<sup>0</sup> to 100<sup>0</sup> F in the hot season from September to March and between 70<sup>0</sup> F and 85<sup>0</sup> F in the cool season. There is a marked rainy season from mid- November to mid-May, usually broken by dry spell during December. The annual rainfall is usually between 1000 mm and 1250 mm.

The concession area is generally forested, with stand of miyombo trees comprising thin spindly trees, partly high grass and thin, scattered bushes.

## **10. Hydrology and Hydrogeology**

The concession area lies at headwater of two major river system- Muhukuru river and seasonal streams which drain its water to Muhukuru river. The Muhukuru river cross the concession at the middle drains south west of the Primary Licenses.

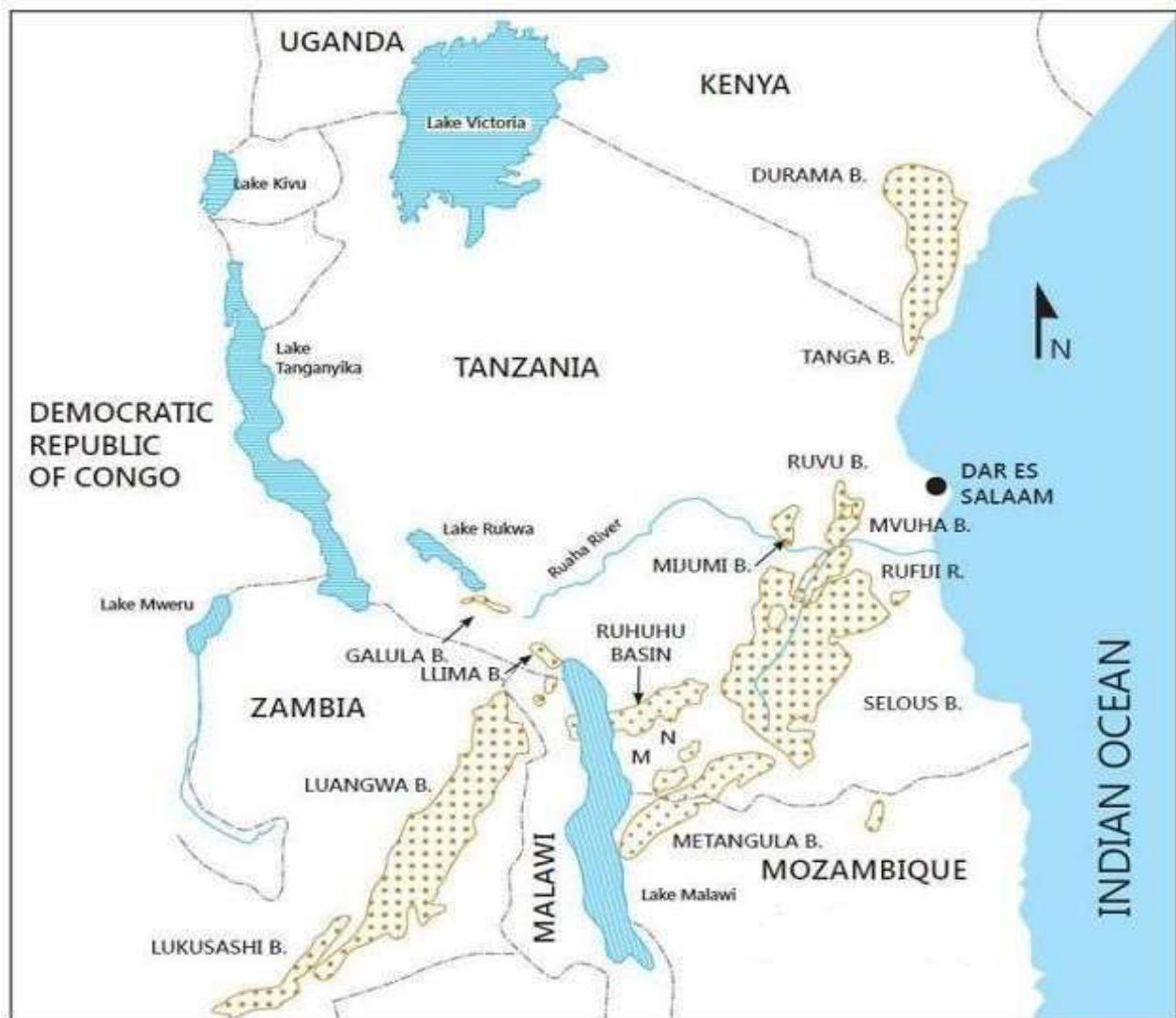
The hydro –geological condition of the surveyed area is characterized by the Muhukuru river and the surrounding valleys. The pre-Cambrian rocks are collectively referred to as the Basement Complex and Karoo rocks are the most important geological units. The majority of the water supply from the groundwater in the Basin will inevitably have to be derived from these rocks. A water supply from groundwater in the area would for a large part depend on the Karoo Rocks. A Correlation from geological logs for the few boreholes drilled from the surveyed area show that, superficial sand and clayed sand is present even at shallow depths. Thus, semi consolidated sand are the expected aquifers in the surveyed area.

## CHAPTER TWO

### 2.0 GEOLOGY AND RESOURCE ESTIMATION

#### 2.1 Regional Geology

Geographically, the Karoo Super group equivalent deposits in Tanzania form a southwest trending corridor, extending from the border with Kenya in the northeast to Lake Malawi/Nyasain the southwest, from where they continue into Malawi (Ring, 1995) (Figure 3).



*Figure 3: Map showing the Karoo aged basins (stippled brown) of Tanzania in a regional context. Modified after Wopfner (2002).*

Geologically, the Karoo aged rocks occur in several separate, structurally controlled intracratonic grabens or half-grabens, which strike north-northeast to northeast (Figure 3) and are tilted to the east, southeast or south. They are faulted into the Ubendian basement and the boundary faults significantly post-date deposition, probably being most active during the Early to Middle Jurassic as a result of the breakup of Gondwana. The major uplift that led to exposure of many Karoo-agesuccessions on the rift shoulders however took place from the Eocene to Miocene (Kent 1971). Of these basins, only the Muhukuru coalfields, which is located on the eastern rift shoulder of the Nyasa Rift(Figure 3), is pertinent to this report and as such is the only basin covered here in detail.

## **2.2 Geology and Mineralization of Muhukuru coalfields**

The Karoo system covers a considerable part of the country in about seven basins, most of which are fault bounded. The rocks are dominantly continental sediments, ranging from Permo- Carboniferous to lower Jurassic in age. The sediments rest uncomfortably on even surface of Archaean crystalline rock. The beds are made up mainly of sandstones, often coarse and gritty with shales and siltstones. The only mineral of economic interest is coal (bituminous). Coal bearing beds of Permian age are developed in Karoo rocks of the south-west and west of Tanzania.

The basement of the Muhukuru coalfields is formed by migmatites, gneisses, amphibolites, mylonites and marbles of the Palaeoproterozoic metamorphic complex of the Ubendian Belt (Wopfner, 2002). Northeast trending faults subdivide the Muhukuru coalfields into three sub-basins, which from the northwest to the southeast are the Ketewaka-Mchuchuma, Ngaka and Lumecha sub-basins. Of these, only the Mchuchuma and Ngaka sub-basins (Figure 4) are pertinent to this study. These two sub-basins are separated by the Namchwea Fault, which has a throw in excess of 1,000 m (Wopfner, 2002).

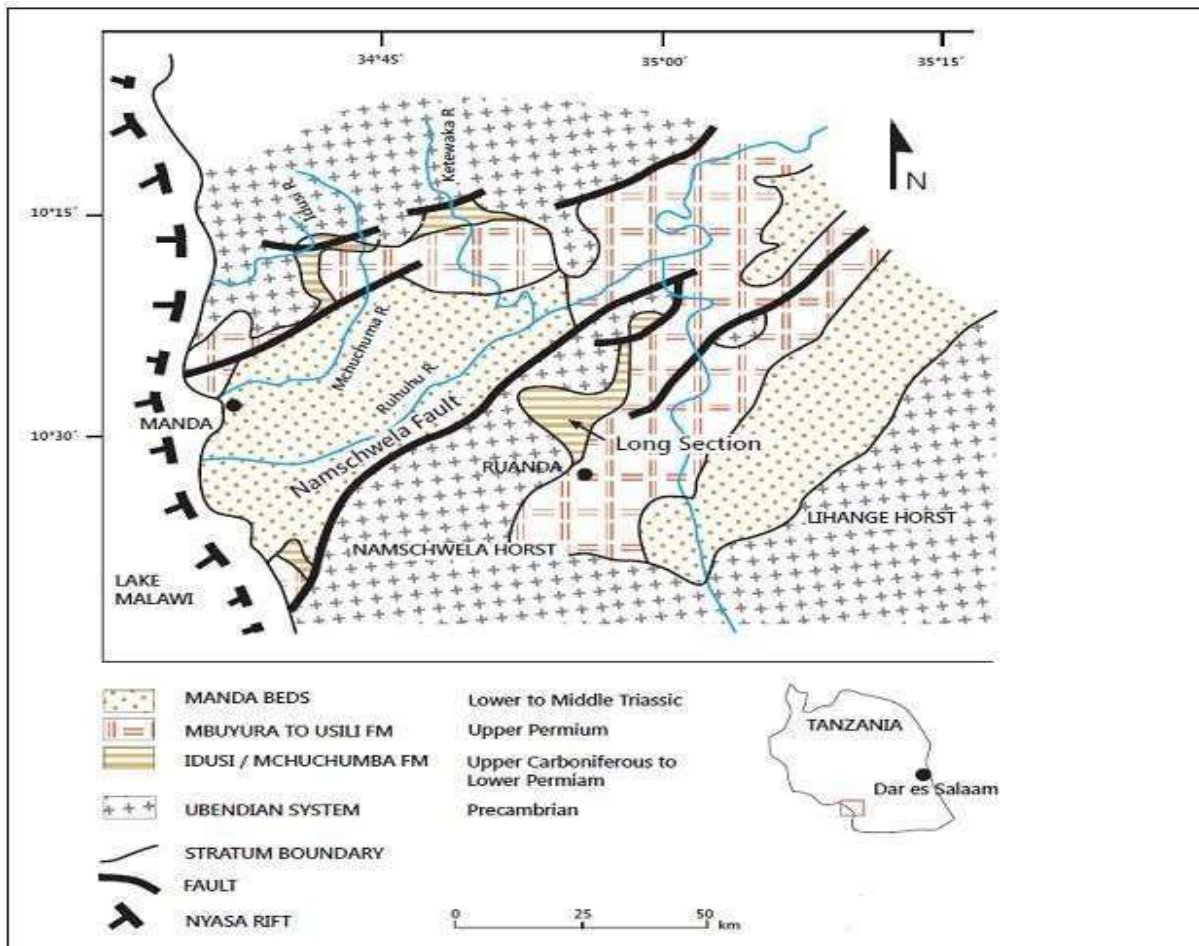


Figure 4: Generalized geological map of the Muhukuru coalfields as pertinent to the areas worked for this project. From Wopfner (2002)

In the Muhukuru coalfields the coal seams hosted in sandstone (sandstone-coal facies) are thick and persistent whereas seams associated with shale and minor sandstone (shale -coal-sandstone facies) is non- to sub-economical. The sandstone dominated facies occurs only in some of the coalfields, particularly in the Muhukuru coalfields, whereas the shale dominated facies is reported in almost all the coalfields. The sandstone-coal facies usually contain several fining upwards cycles which invariably start with coarse basal sandstone followed by coal or carbonaceous shale. A new cycle starts usually with an erosive base on the coal or shale.

## **MINING AND EQUIPMENT SELECTION**

### **3.0 Coal Mining Operation**

Mining will be undertaken by conventional open pit methods. During pit development, the surface top soil layer will be cleared by dozers where practically feasible. Top soil from the pit will be stockpiled at a designated area for use during rehabilitation programmed. After drilling, hydraulic excavators and haul trucks will be used to load and transport coal materials and waste rocks. The coal materials will then be stockpiled according to their size while the waste rocks will be hauled and dumped to a well-engineered waste rock dump. Estimated amount of coal materials to be mined per day is expected to be 1,500 tons with size ranging from small to large. Amount of waste rocks to be produced is estimated as 5,445,845m<sup>3</sup> and will depend on the mineralization of the pit area that will be determined by ongoing explorations.

### **3.1 Mining Method**

Coal mining is normally executed through several methods namely Open Pit/Cast, Auger, underground and many other mining methods. Apart from other factors including geotechnical, environmental, social, and legal and Ore body Orientation, the economics is the pilot factor to mining method selection. Considering the fact that coal formation are sedimentary type of rock, almost parallel flat laid seems like 30deg for Ruvuma coal mine, the mining method used in this project is the open pit mining. This method is the striping of materials by benches with steps from the surface to the bedrock. Mining will involve exposing a large area using a bulldozer and cutting through layers of overburden until the seam coal is exposed. When overburden has been removed from the coal seam, the roof of the seam is cleaned using bulldozers. The coal seam is then drilled and blasted. Bulldozers clean down to the floor of the coal seam and front end loaders and coal trucks transport coal to the stockpile.

Considering Quality of coals, bulky handling challenges and market price, it is critical to ensure lower stripping ratios are controlled and hence mine profitability. Most of the Tanzanian deposits are of lower quality hence additional processes of adding value, especially washing plant to reduce Ash levels and sulfur levels, and hence increased CV to meet market requirements.

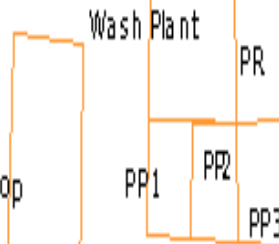
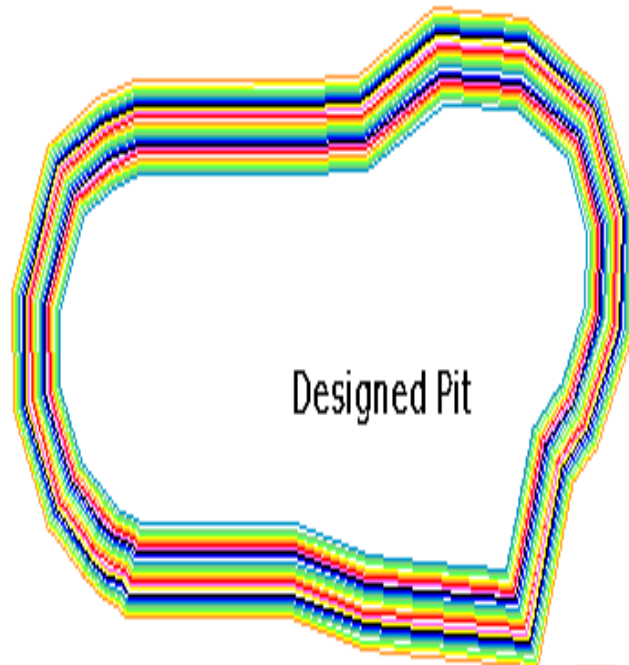
Several factors were considered for analysis including geotechnical factors like size of benches and slopes, machines selection, Ventilation systems, dewatering systems, Coal washing and quality controls and others to make the whole system complete and efficient. An overall layout plan involving Mining Pits and Dumps, ROM pad and wash plant, several material Piles, Settling Dams, workshops, Administration, Accommodation, Laboratory, fuel bay, storage area and other necessary infrastructures are presented in Figure 11.

CCJ/MBH

CCJ/MBH

### Abbreviation

- PP1-----Product Pile 1
- PP2-----Product Pile 2
- PP3-----Product Pile 3
- TSC-----Top Seam Coal
- BSC----- Bottom Seam Coal
- SP-----Settling Pond
- WC-----Washing Coal Plant
- CR-----Coal Rejects Pile



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Cremcom Software

Lhumbi Coal Project  
Site Layout Plan

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*Figure 11: Sketch map showing proposed site layout plan*

The potential coal seams dipping to the NE at 10 to 15 degree. Waste dumps are located on the southern side of the Pits, assuming is a foot wall with no room for mining expansion. Another Pit may be developed depending on coal extension and quality blending requirements as exploration continues

Hauling of raw coal to the raw coal piles at the ROM pad will be categorised as Top and bottom seam coals for quality control. More categories may be considered. Raw coal may be washed or screened to reduce fines. Hence a Wash Plant area and fine coal piles area as indicated in Figure 12 will be considered as part of processing plant. This process will be guided by market quality needed, but anything below 10mm, is usually referred to coal fines used for domestic and direct feed for power plants.



*Figure 12: Coal Wash Plant with different Coal Products Piles*

### **3.2 Mining Infrastructures Design**

Coal Mining set up doesn't require many structural designs as compared to metal mines. The main infrastructures designed include the Pits and Waste dumps. Coal ROM pad is merely a wide flat ground with no any structural design. This is because the crushing circuit is not necessarily elevated because only simple crushing mechanics are used. Again, handling of materials to control blending is obvious and hence a flat laid ground offers more safety environment compared to elevated ROM PAD.

Again, simple settling Ponds are made and shifted periodically to allow emptying of sediments in a dam, hence a simple Dam with size according to washing needed is created, lined with 1.5mm thick liners to control water seepage and hence loss. These other piles are piled and loaded frequently and hence only a flat ground is needed to allow trucks loading to the market

### **3.2.1 Pit Mine Design**

A pit mine was designed in the project area (Figure12). The Pit was designed to ensure Maximum coal recovery at the stripping ratio of 2:1. To ensure recovery, the foot wall slope angle was made 30 degrees, the same to the deep of the coal seams. The final pit wall is lying right at the bottom of the bottom seam, i.e. both seams will be mined to the Pit Limit.

The hanging Wall was designed at the slope angle of 60 degrees to ensure stable Pit. But mining can be expanded on the hanging wall and either east or west as the economic stripping ratios allow. Bench height was made at 10m, berm width 4m, Ramp width 10m at a slope of 10% for both Pits. Actual costs for mining and washing as well as recoveries will be captured after the start of production and hence statistically will help to review economic stripping limits and hence Pit design adjustments,

### **3.2.2 Waste Rock Dump Design**

A waste dump was designed and is located to the southeastern part of the main pit, on the foot wall. This is an area not expected to have any underneath coal deposit. Again, the location has considered providing shortest hauling distances. But most of the overburden will be strategically planned to be backfilled to the Pit and ensure the Pit is mostly covered with Non-Acid forming materials (NAF).

The Dumping strategy is also aimed at ensuring the mud stones and low coals with sulphur (i.e.<1%), that are Potential Acid forming materials (PAF) are dumped at the centre of the dump, and overburden dumped at the perimeter to ensure limited access of water flowing to PAF materials. A minimum of 20 m of NAF is recommended to cover the PAF materials on the perimeter of the dumps. Two lifts were designed for each dump, with potential of two more lifts on top. Overall Slope angle is 35 degrees, 10m height, 5m berm width, 10m ramp width at 10% gradient.

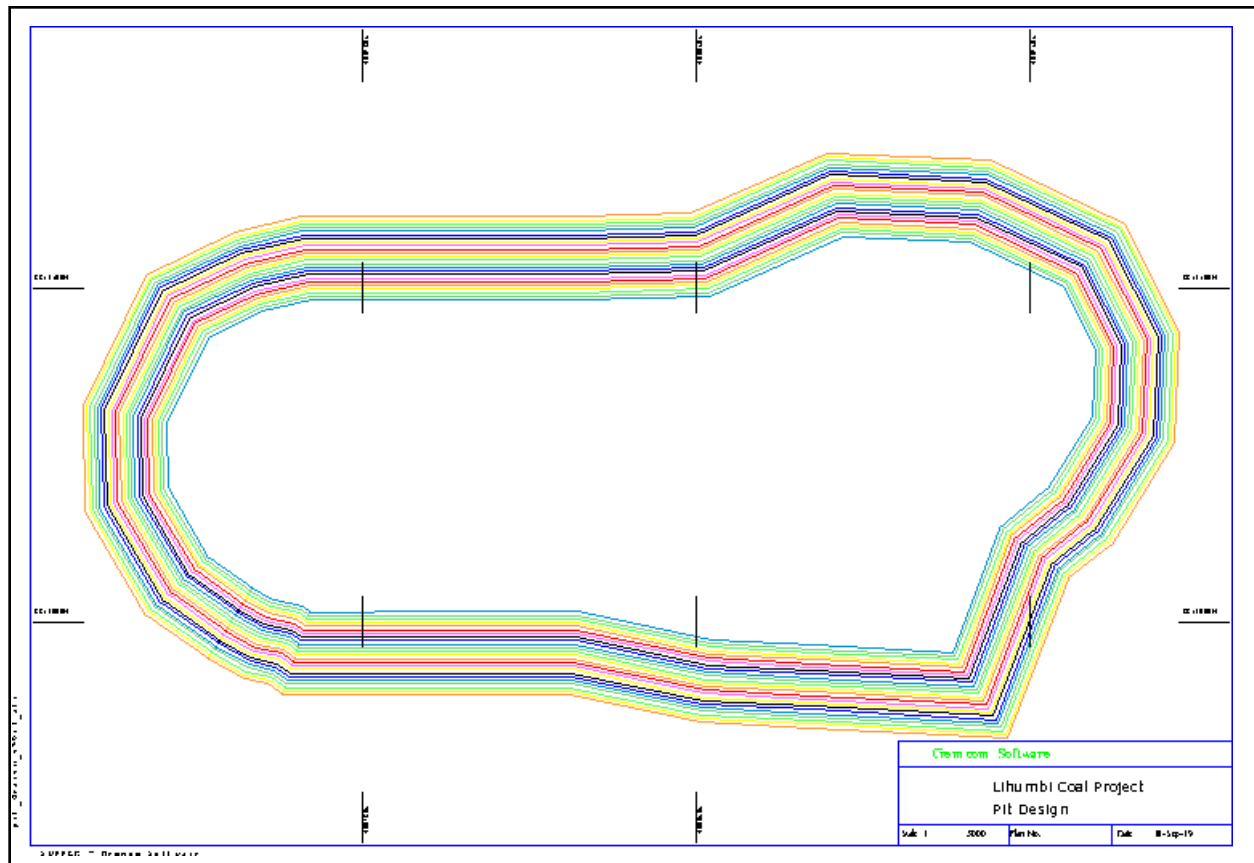
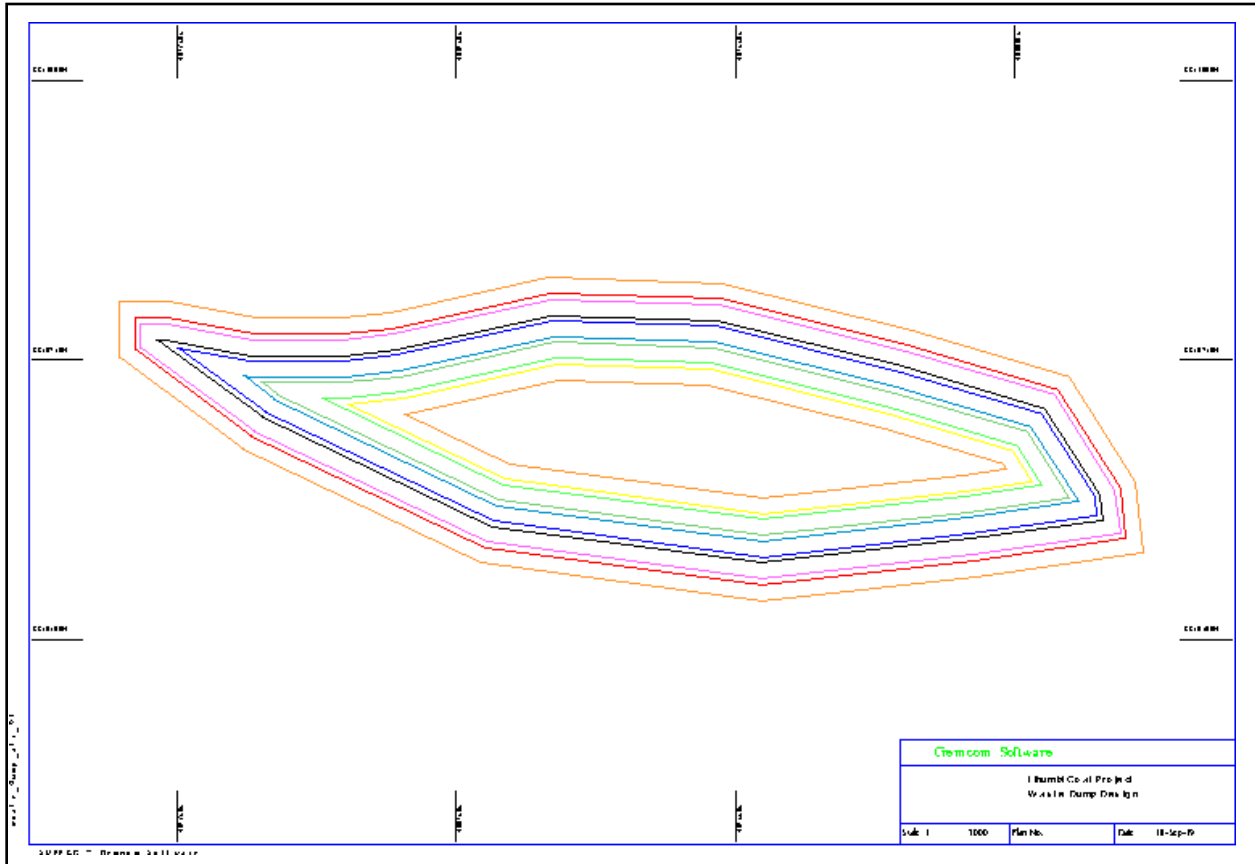


Figure 13: Sketch map showing Pit design



*Figure 14: Sketch map showing Waste dump design*

### **3.3 Blasting**

Most of the coal deposits offer soft to medium hardness rocks, hence free digging is preferred. Sometimes, some hard parts to exists and hence to ensure good productivities and reduced equipment maintenances, a little shaking blast is deployed.

Again, to ensure smooth and stable pit walls, a controlled blasting involving pre-splitting and trim shots or all together can be considered by a drill and blast engineer on site.

### **3.4 Dewatering**

In most cases coal Pits are characterized by water flowing either from surface runoff or infiltration from pit walls. The best practice is not to collect water in-site the pit. Especially areas with PAF materials, because that will give enough time to react and form acidic drainage. Hence at all the time mining should be planned to ensure water are flowing toward dedicated channels, and any collection for quality checks or pumping should be located out of coal area (PAF) materials.

It's the best practise to ensure the water pH is controlled with lime before pumped or released to the natural water bodies to save sumps life as well as other species. Temporally water sumps on the NAF ground and permanent sumps need to be covered with liners to ensure zero seepage.

### **3.5 Mining Plan**

DARESA Coal Project will be an opencast mine with the geology conducive to implementing large truck and shovel mining method.

- DARESA coal Project contains a number of coal seams with their dips requiring the walls of the pit to be benched for stability at bench height of 10m, berm width 4m, ramp width 10m at a slope of 10% for both designed Pits. Hence the use of the opencast large truck and shovel mining method;
- Overburden waste material will be pre-stripped in the initial box-cutting and ramp-building stage to establish an in-pit coal inventory before coal extraction proceeds. Thereafter, for the following 5 years, there will be a low to moderate annual overburden strip ratio of 2:1
- A cut pit optimization exercise was used to develop the economics of the coal deposit in relation to its technical aspects
  - The practical pits will extend from an average depth limit of 100m below surface (Borehole intersection depth range)

- Due to the fragile nature of the coal, “trough seam blasting” technology will be employed to break the parting and coal seams. This will minimize coal losses as well as coal contamination during the loading process;
- To minimize haulage distances, the coal processing plant will be located to the South West of the Pit which is the largest pit with the greatest portion of coal reserves;
- Operational expenditure (opex) is based on a contractor mining model, while the DARESA INVESTMENT LIMITED owner’s team will be responsible for cost management and mine design and planning.

Therefore, Mining plan should ensure the top most coal is mined first. i.e. coal should advance/lead on the footwall to ensure creating a room to finish mining and start backfilling of mined out areas. It is critical to ensure at all the time when mining PAF materials, NAF are prepared for anchoring and cover PAF from the access to the flowing water.



*Figure 15: Picture showing coal mining on top advancing to footwall*

### **3.6 Supporting Facilities.**

The project is expected to have on site facilities such as water supply facilities, waste storage facility, raw water dam, accommodation camp, workshop and waste rock dump which are outlined below.

### **3.6.1 Water supply facilities**

According to the climatic condition of the area, most of the streams are seasonal but there is only river which is located at distant of 1km from the project site, this river will provide water for the project consumption. In order to fulfill water needs to the mine, the trucks will be carrying water from this water source. However, as far as the project is concern the Proponent will establish boreholes within the project area for water source for about 5000 liters per day. Therefore, the project is expected to get water from boreholes. The number of boreholes is still undetermined waiting for hydrological studies that have to be carried out. There will be a potable water treatment facility to treat water for human consumption at the project site. The type of facility to be employed will depend on the results of ground water quality analysis. for the project consumption. In order to fulfill water needs to the mine, the trucks will be carrying water from this water source. However, as far as the project is concern the Proponent will establish boreholes within the project area for water source for about 5000 liters per day. Therefore, the project is expected to get water from boreholes. The number of boreholes is still undetermined waiting for hydrological studies that have to be carried out. There will be a potable water treatment facility to treat water for human consumption at the project site. The type of facility to be employed will depend on the results of ground water quality analysis.

### **3.6.2 Offices, Stores and Workshops**

DARESA INVESTMENT LIMITED intends to employ 50 workers at the start of the project and the number is expected to increase as the project development progresses. The workers will be in groups of senior staffs, operators, miners and security guards. For the case being accommodation camp will be inevitably constructed. Offices and workshops will also be constructed at the site.

### **3.6.3 Energy**

At the beginning MIL will use 250 KV generators to generate electric power. The future plan is to use electric power from TANESCO (Tanzania Electric Supply Limited) . Available power will be used in driving the machinery equipment and part of it in accommodation facilities and workshops.

### **3.6.4 Fuel supply**

Equipment used in operation will be fueled from the filling station which will be installed temporarily within the project site. However, all lubricants, spare parts and fuel will be transported from Dar es Salaam depot stations at a distance of about 1000 km to the project area. Transportation will be organized by MIL trucks to carry fuel to the site for the trucks and machinery consumption.

### **3.7 Environmental Management, Health and Safety**

DARESA INVESTMENT LIMITED will be in the process of developing a comprehensive Code of Practice that will satisfy relevant Tanzanian legislation, but will also draw on their experience in the global mining industry, which has highly developed safety practices. The Code of Practice will cover matters such as areas of responsibility, workers' health and safety, working instructions for mine operations and emergency procedures in case of accidents or any failure, first aid provisions, procedures for starting up and shutting down machinery, communication channels, safety drills, equipment and materials required, storm water handling in case of heavy rains, mine inspections and safety assurance.

In addition to communicable diseases such as malaria, cholera, HIV, etc. workers can also suffer injuries and be subject to occupational diseases. All workers at mines will have access to medical facilities.

Of particular interest to the mining industry are diseases related to dust generated by drilling such as pneumoconiosis, which is caused by very fine particles of silicate minerals building up in the lungs and reducing their efficiency, but it remains prudent to use dust suppression measures such as water sprays and wet drilling techniques and to monitor the workers' exposure to dust.

The Code of Practice will also encompass an Environmental and Social Management Plan (ESMP). Initially, it will contain the ESMP described in an EIA report. A Code of Practice is a live system, which is not only put into daily practice, but is also updated whenever new information is obtained or new and better equipment or procedures are developed.

### **3.8 Time Schedule, Staffing and Closure**

#### **3.8.1 Time schedule**

DARESA intends to complete all construction and other preparation work within 12 months of receiving a mining license and to start mining and production basis after an additional 6 months. A gradual build-up in production is envisaged, with full production at steady state being reached from year 2 onwards

#### **3.8.2 Staffing and Support**

The personnel complement is outlined in the Employment and Training program. Training in the various skills required for the various positions including safety training will be provided by MIL. Most of the positions will be filled by local people.

#### **3.8.3 Mine Closure and Rehabilitation**

Closure requirements will depend upon the applicable legislation and standards at the end of the life of the operation and a total of US\$ 200,000 is allocated annually to facilitate the program (Table 12). General closure plan as provided by DARESA INVESTMENT LIMITED is as follows:

- **Open pit Mine:**  
All entrances to the mine would be rendered safe by replacing with rock and sealing the entrances with concrete.
- **Installed Structures:**  
At closure, the installed structures would be demolished. Any salvageable items would be removed from the site and reusable materials such as metals, wood and plastics would be either offered to local communities or sold as scrap.

- **Buildings:**  
Structures that are considered to be usable may be left in place after consultation with the local communities and regional authorities. Other structures should be knocked down and the rubble used as landfill and for the plugging of disused mine workings. Demolition costs and rubble removal would be included in the closure costs.
- **Sites:**  
After removal of the structures and buildings, the various sites will be ripped or ploughed and re-vegetated with indigenous species.
- **Waste storage facilities/dumps:**  
Deposition of waste materials and products will be continuous throughout the lifetime of the operation, but the lower slopes of the dump will become inactive as the dump grows. Re-vegetation will require a layer of about 300 mm of topsoil. In order to reduce erosion and visual intrusion, the embankment structures will be progressively re-vegetated as the dump grows. The cost of re-vegetation is included in the operating cost.

### **3.9 Production Scheduling**

It is planned to mine approximately 540,000tons per year of coal and approximately 1.7million Mt of waste per year from development faces of an open pit mine. To achieve this target a pit will be developed being capable of approximately 1,500 tons per day of coal and 5,400 tons of waste materials. The dumper trucks for transporting the mined material will be used into the production pit.

The following schedules for the mine and coal beneficiation process will be applicable:

- The mine will be operating for two shifts of 8 hours per day;
- The mine will be working for 400 hours per month;
- Coal Production per day will be 1,500 tons, 45,000 tons per month and 540,000tons of coal annually and operating days for a year is 300 days;

**Therefore, considering the annual production of 540,000/yr and the life of 10 years, the mine will be in a position to produce 5.4 Million tons during its life time.**

- Waste rock from development workings is expected to be 5,400 tons per day

### **3.10 Mining Equipment Selection**

Selection of the types, number and capacity of mining equipment and machinery to achieve a daily production of 1,500 tons per day of coal and 5,400 tons of waste material per day is necessary.

#### **3.10.1 Mining Equipment**

For selected open pit mining operations will need the under mentioned equipment and machinery which includes:

- Load and Haul equipment such as excavators, trucks and loaders;
- Drilling and Blasting equipment such as rigs and accessories i.e. jack and pick hammers;
- Supporting equipment such as bulldozers; and

- Auxiliary Equipment such as water trucks, motor grader etc.

Generally, the type, capacity and number of selected equipment and machinery have been categorized as Primary mining equipment and Auxiliary equipment as indicated in Table 4, 5 & 6).

**Table 4: Summary showing primary mining equipments for DARESA Coal Mining Project in RuvumaRegion**

Primary Mining Equipments		
Item	Description	Qty
1	47 T Excavator (1 dedicated to coal and 1 to overburden	2
2	30 T Articulated Dump Truck	8
3	CAT D6 Dozer or Equivalent	2
4	Wheel loader, type CAT 935	2
5	Drilling Equipments	2
6	Standby Power Generator, KVA 250	1
7	Mobile Lighting Plant	6
8	Pit dewatering pump	1

### 3.10.2 Auxiliary Equipment

Other auxiliary equipment that will be needed for day to day operations to enable a production of 1,500 tons per day of coal has been shown in Table 5. These include office equipments and administration supplies.

**Table 5: Summary showing auxiliary mining equipments for DARESA coal Mining Project in Ruvuma Region**

<b>Auxiliary Equipments</b>		
<b>Item</b>	<b>Description</b>	<b>Qty</b>
1	15kL Water truck	1
2	Motor Grader	1
3	Office furniture & fittings	2
4	Computers, photocopiers, printers, telephones, etc.	2
5	4 WD pick-up trucks	2
6	Warehouse Equipments	1
7	Security system & equipment (video cameras, sensors, etc.)	2
8	Kitchen ware and equipment	1
9	Reserve domestic water tanks, SIM tanks, 10,000	1
10	Safety Equipment and accessories for mine workers	60
11	Mine Rescue equipment and accessories for one team	2
12	Communication system	2
13	Water Bowser, 10,000 liters	1
14	Workshop equipment and tools	1
15	Survey equipment (Plotters, Total Station, & accessories)	1
16	Geology equipment (sampling equipment, etc.)	1
17	Administration Office & Change House building	1

### 3.10.3 Processing Plant and Machinery

During initial stages of coal mining, DARESA INVESTMENT LIMITED proposes to install a coal washing plant and processing plant. This is due to the fact, right at some depth, DARESA Coal Project is characterized by a high quality termed bright seams that in fact will need only washing plant. The accessories and type of processing plant equipments are anticipated to be purchased from China and or at any open market in accordance to Company's standards (Table 6).

**Table 6: Summary showing processing plant and machinery required for DARESA coal mining project in Ruvuma Region**

<b>Processing Plant Equipments</b>		
<b>Item</b>	<b>Description</b>	<b>Qty</b>
1	Feeder Breaker with Integrated Chain Conveyor	1
2	Belt Conveyor	5
3	Vibrating Classification Screen	2
4	Screen Chute, Pump Tank & Pump	1
5	Hydrocyclone Cluster	1
6	Spiral Block	1
7	Product Dewatering Screen	1
8	Pump Tank & Pump for Spiral Refuse	1
9	Coal Dewatering Screen	1
10	Refuse Dewatering Screen	1
11	Hutch Water Sump	1
12	Pump Sump & Pump	1

13	Thickener	1
14	Thickener Underflow Pump	1
15	Pump for Water Distribution	1
16	Instrumentation Package (Flowmeter, Belt Tares, etc.)	1
17	Control Cabinet	1
18	Steel Structure & Plate Works	1
19	Piping	1
20	Electrical Appliances	1

## CHAPTER FOUR

### 4.0 COSTS ESTIMATION FOR THE PROJECT

#### 4.1 Project Financing

Prior to the project investment, DARESA INVESTMENT LIMITED intends to procure all machinery and equipments for mining, processing and material haulage from its equity of which accounts to 40% and short-term loan from local banks which accounts to 60% of the proposed financing (Table 7). The infrastructure system for the mine which includes: mine operation offices, processing plant offices, administration block and engineering offices will be financed by the company's capitalized equity (i.e. US\$ 4,820,000) and its short-term loan from local banks (i.e. US\$ 7,320,000). The summary of the total investment subject to the mining operations and investment plan is indicated in table 8 and Appendix 2.

**Table 7: Summary showing proposed financing for DARESA Coal Mining Coal Project in Ruvuma Region**

PID	PROPOSED FINANCING ARRANGEMENT FOR THE PROJECT			
	Description	Proposed Investment Cost (US\$)	Total (US\$)	%
1	Equity	4,820,000.00	4,820,000.00	40.00
2	Working Capital	0.00	0.00	0.00
3	Short Term Loan	7,230,000.00	7,230,000.00	60.00
<b>Grand Total</b>			<b>12,050,000.00</b>	<b>100.00</b>

**Table 8: Summary showing total investment costs for DARESA Coal Project in Ruvuma Region**

PID	Project Financing and the Capitalized Equity for DARESA Coal Project		
	Description	Qty	Cost in US\$
1	Mining Equipments	34	5,980,000
2	Processing Plant and Machinery	25	4,090,000
3	Engineering and Technical equipments	20	1,611,000
4	Safety Equipments	62	74,000
5	Administrative Equipments	13	295,000
<b>Grand Total</b>			<b>12,050,000</b>

## **4.1 Operating Costs**

Operating costs focus on the day-to-day running of a mine. These costs can be divided into fixed and variable costs. Variable costs vary with the tonnage produced; these costs include fuel, explosives and electricity costs. Fixed costs, on the other hand, are independent of the tonnage produced, and they include labour costs that are not linked to production. Generally, operating costs are expressed in total costs per ton of ore mined.

Annual consumption of these consumables is estimated based on existing prices of commodities at Mbinga District, Ruvuma Region and the surrounding environment. Those which cannot be sourced from Mbinga, Songea or Dar es Salaam have been searched through the internet and somefrom used equipment web sites. In most cases, professional judgment and experience of the existing coal mining operations at Mbinga have been used to come up with the cost estimates for the project.

### **4.1.1 Mining Supplies**

Mining supplies that will be required to produce 1,500 tons per day or 540,000tons of coal per year has been estimated and presented in Tables 9. These costs are based on operating at differentlocations of the Mining License area.

**Table 9: Summary showing the mining consumables and supplies of a day-day mining operation**

<b>Mine Consumables and Supplies</b>				
<b>Item</b>	<b>Description</b>	<b>Qty</b>	<b>Unit Price (US\$)</b>	<b>Total Price (US\$)</b>
1	15kL Water truck	1	130,000	130,000
2	Motor Grader	1	260,000	260,000
3	Office furniture & fittings	2	3,500	7,000
4	Computers, photocopiers, printers, telephones, etc.	2	3,000	6,000
5	4 WD pick-up trucks	2	50,000	90,000
6	Warehouse Equipments	1	25,000	25,000
7	Security system & equipment	2	10,000	20,000
8	Kitchen ware and equipment	1	50,000	50,000
9	Reserve domestic water tanks, SIM tanks, 10,000	1	2,000	2,000
10	Safety Equipment and accessories for mine workers	60	800	48,000
11	Mine Rescue equipment and accessories for one team	2	13,000	26,000
12	Communication system	2	10,000	20,000
13	Water Bowser, 10,000 liters	1	50,000	50,000

14	Workshop equipment and tools	1	40,000	40,000
15	Survey equipment (Plotters, Total Station, & accessories)	1	80,000	80,000
16	Geology equipment (sampling equipment, etc.)	5	4,000	20,000
17	Administration Office & Change House building	1	100,000	100,000
18	Fuel storage tanks and pumps	1	40,000	40,000
19	Drilling Consumables	1	800,000	800,000
20	Fuel, Lubricants and spare parts	1	100,000	100,000
20	Electric power extension and transformer	1	36,000	36,000
<b>Grand Total</b>				<b>1,950,000</b>

#### 4.1.2 Direct Mine Labor Cost

To be able to produce 540,000tons of coal per year, a significant number of miners, technical services, workshop, and other supporting workers must be employed to realize the anticipated production. Table 10 provides the direct labor engaged with production and support services requirements.

**Table 10: Summary showing labour force costs for the DARESA coal mining project in Ruvuma Region**

Direct Mine Labour Costs							
Department	Title	Persons	Costs	1	Year 1	Year 2	Year 3
			US\$	Month	US\$	US\$	US\$
Mining	Mining Engineer	1	2,000	2,000	24,000	24,000	24,000
	Mine Foreman	1	1,000	1,000	12,000	12,000	12,000
	Driller	2	500	1,000	12,000	12,000	12,000
	Operator	3	600	1,800	21,600	21,600	21,600
	Loader Operator	2	500	1,000	12,000	12,000	12,000
	Truck Drivers	10	450	4,500	54,000	54,000	54,000
	Pickup 4WD driver	1	400	400	4,800	4,800	4,800
<b>Sub-total</b>		<b>20</b>	<b>5,450</b>	<b>11,700</b>	<b>140,400</b>	<b>140,400</b>	<b>140,400</b>
Workshop	Mechanical Foreman	1	1000	1000	12,000	12,000	12,000
	Electricians	1	1,000	1000	12,000	12,000	12,000
	Mechanics	3	1,000	3000	36,000	36,000	36,000
	Fitters	2	500	1000	12,000	12,000	12,000
	Plumbers	1	500	500	6,000	6,000	6,000
	Welders	1	500	500	6,000	6,000	6,000
<b>Sub-total</b>		<b>9</b>	<b>4500</b>	<b>7000</b>	<b>84,000</b>	<b>84,000</b>	<b>84,000</b>
Technical Services	Geologist	1	2,000	2,000	24,000	24,000	24,000

<b>Sub-total</b>		<b>1</b>	<b>2000</b>	<b>2000</b>	<b>24,000</b>	<b>24,000</b>	<b>24,000</b>
HSE Section	HSE Officer	1	1,500	1,500	18,000	18,000	18,000
	HSE Attendants	1	500	500	6,000	6,000	6,000
	Medical Attendant	1	500	500	6,000	6,000	6,000
<b>Sub Total</b>		<b>3</b>	<b>2,500</b>	<b>2,500</b>	<b>30,000</b>	<b>30,000</b>	<b>30,000</b>
Management and Supporting Service	Mine Manager	1	2,500	2,500	30,000	30,000	30,000
	Financial Manager	1	1,500	1,500	18,000	18,000	18,000
	Accountants	1	1,000	1,000	12,000	9,600	9,600
	Public Relations officers	2	990	1,980	23,760	16,800	16,800
	Secretary	1	300	300	3,600	3,600	3,600
	Supplies Officer	1	500	500	6,000	6,000	6,000
	Stores Clerk	1	350	350	4,200	3,600	3,600
	Messenger	1	250	250	3,000	2,400	2,400
security guards	6	270	1,620	19,440	18,000	18,000	
<b>Sub Total</b>		<b>15</b>	<b>5,160</b>	<b>10,000</b>	<b>120,000</b>	<b>120,000</b>	<b>120,000</b>
<b>Total Labor Cost</b>		<b>48</b>	<b>19,610</b>	<b>33,200</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>

#### 4.1.3 Administration and Financial Costs

Financial and administrative expenses will be expenses incurred in running the

<b>Administration and Financial Costs</b>						
<b>Administrative Overhead</b>	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	US\$	US\$	US\$	US\$	US\$	US\$
Bank, inventory proc. Cost and stationery	50,000	50,000	50,000	50,000	50,000	50,000
License and Legal fees	30,000	30,000	30,000	30,000	30,000	30,000
Travelling & Accommodation (OUT)	30,000	30,000	30,000	30,000	30,000	30,000
Travelling & accommodation (TZ)	15,000	15,000	15,000	15,000	15,000	15,000
Office Rent and other costs (DSM)	10,000	10,000	10,000	10,000	10,000	10,000
Fuel, oil and Lubricants for light vehicles	50,000	50,000	50,000	50,000	50,000	50,000
Equipment Maintenance	100,000	100,000	100,000	100,000	100,000	100,000
Building Repairs	30,000	30,000	30,000	30,000	30,000	30,000
Consultancy fees	20,000	20,000	20,000	20,000	20,000	20,000

mining operations at Songea including managing the miners, assets, supplies and other consumables, security, safety, health and environment. These involve also financial transactions, legal and statutory obligations related with the running of the DARESA Coal Project. Table 11 presents the breakdown of these costs.

***Table 11: Summary showing administrative overhead costs for DARESA Coal mining project at least in six years of mining operations***

Public relation and community support	20,000	20,000	20,000	20,000	20,000	20,000
Medical and Health care cost	10,000	10,000	10,000	10,000	10,000	10,000
Directors fees and board meetings	20,000	20,000	20,000	20,000	20,000	20,000
Head office admin and comms costs	20,000	20,000	20,000	20,000	20,000	20,000
Workers Canteen	50,000	50,000	50,000	50,000	50,000	50,000
<b>Grand Total</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>

#### 4.1.4 Other Supporting Services Cost

Other support services costs are those to deal with the geology, survey works, environmental, etc. These have been estimated as indicated in Table 12.

**Table 12: Summary showing supportive equipments for DARESA Coal mining project**

Supporting Services Cost				
Item	Description	Qty	Unit Price (US\$)	Total Price (US\$)
1	Warehouse Equipments	1	25,000	25,000
2	Workshop equipment and tools	1	40,000	40,000
3	Survey equipment (Plotters, Total Station, & accessories)	1	80,000	80,000
4	Geology equipments	5	4,000	20,000
5	Fuel storage tanks & pumps	1	40,000	40,000
6	Electric power extension and transformer	1	36,000	36,000
7	Water supply system	1	30,000	30,000
8	Access roads construction	1	100,000	100,000
9	Gen set light 1 set	4	20,000	80,000
10	Laboratory Equipments	1	10,000	10,000
11	Safety Equipment and accessories	60	800	48,000
12	Mine Rescue equipment and accessories	2	13,000	26,000
13	Mine Rehabilitation and Closure	1	200,000	200,000
Grand Total				735,000

#### 4.2 Employment

It is planned that the peak workforce required will be close to 23 permanent employees and 37 casual labors. The construction phase should take at about 12 months. All employees will be Tanzanians with exception of very few experts

whenever necessary.

### **4.3 Training Program**

DARESA INVESTMENT LIMITED is committed to training local Tanzanians in all the fields of the work that will be carried out on the project site. Training program will be made available when the work starts. Priorities will be given to communities around the project in the aspect of empowering them for employment and supplies of goods and services. Recruitment process from other cadres of work force shall come directly from the community around DARESA area. The project shall create direct employment to over sixty people and indirect employment to several hundred others. In this time when employment poses a serious social challenge, the project is welcome as it is in the right direction. In house and or service training shall be carried one month ahead of commencing mining operations.

### **4.4 Procurement of Goods and Socio-economic Benefits**

Sources of machinery, equipment and other goods and services will be either locally or overseas depending on availability. In any case priority will be given to local equipment, goods and services. The multiplier effect of income flowing to many households will generally raise living standards and spur economic development in the area and in DARESA region as a whole. Through trade with other regions will cause transfer of economic benefits to other areas.

## CHAPTER FIVE

### 5.0 REVENUE GENERATION

#### 5.1 Projected Revenue Generation

Revenue estimates for coal to be mined is very much dependent on the quality of the coal that has been mined. Table 13 summarizes the projected revenue expected to be generated during the entire life of mine (MOL) based on the following facts stipulated below:

- The market price of coal per ton is taken to US\$ 42;
- The anticipated annual coal mined production of 540,000tons;
- The Income generation per year will be 540,000tons \* US\$ 42 is US\$ 22,680,000 and
- Operating cost is estimated to US\$ 5,588,400 per year.

**Table 13: Summary showing projected production overview, sales and cash inflows for ten years**

Coal Mining (DARESA Coal Field) Feasibility Review									
1: Production of Coal			Monthly	Annually					
Monthly production (Tons)			45,000	540,000					
The Coal Mining and Production for 10 Years shall be as Follows:									
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000
2: Sales and Cash Inflows (US\$ in Millions)									
1: Production of Coal			Per Day	Monthly	Annually				
Monthly production (Tonnes)			1,500	45,000	540,000				

Selling Price of Coal per Ton US\$ 55	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash Inflow shall be as Follows	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$
	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90	18.90

## **5.2 Direct Operating Costs**

During mine operations, an average operating cost of US\$ 10 per ton of coal is subject to all mining production, supporting services such as samples analyses services, engineering services and general administration services throughout the entire life of mine (LOM). Appendix 3, summarizes the entire direct operating costs incurred throughout the life of mine (LOM).

## **5.3 Economic Analysis and Investment**

### **5.3.1 Return on Investment**

The total investment of the DARESA Coal Project shall approximately be US\$12,050,000. At the end of second year from the commencement of mine operations, the project shall have accumulated a projected cash of US\$ 10.06 million (Appendix 4), twice the retained earnings in the first year of operation. This stipulates that, in the second year of mine operations, the project will not recuperate the investment costs, however, the cash flow statement and project's balance sheet indicate the pay back turnaround in three years from the commencement of mine operations (Appendix 5 & 6).

### **5.3.2 Project Cash Flow Analysis**

Expected revenues and cost estimates as made in Chapter 4, which are based on the proposed schedule of operations, were evaluated and a cash flow analysis is generated to determine the Net Present Value (NPV) and the Internal Rate of Return (IRR) of the project. A discounted cash flow analysis that generated a positive present value (NPV) had been used to generate a discounted cashflow (Appendix 7).

Appendix 7 is a cash flow analysis of the project and presents a picture of the schedules of costs and revenues, based on the following assumed financial parameters

- A Discounted Rate of Return on the Project of 10% & 15%
- Royalty of 3%;
- Clearance fee 1%
- Life of Mine is 10 years
- Income Tax rate of 30% applicable for Tanzania;
- Interest on a Long-Term Bank loan of 8%;
- Government Free Carriage 16%
- A five-year investment tax credit has been considered under existing Tanzanian tax rules;
  
- Tax exemption on fuel, oils, and other imported supplies have not been considered and when incorporated will also greatly boost the cash flow of the project.

Based on the above parameters the project has shown to have good potential to generate cash as summarized in some of the important economic indicators shown in Appendix 7.

### 5.3 Sensitivity Analysis

Sensitivity of the cash flow or cash flow deviations from the planned projections provides a picture of the level of risk the project will be undertaking when some economic parameters of the project changes. Some of the parameters such as price of the product, price of inputs, grade of the coal, exchange rates, market interest rates, etc., greatly influence the profitability of the project.

Sensitivity analysis for the quality of coal in the mining project is conducted to determine the volatility of the discount rate, price of coal, size of the coal rock, and changing interest on the bank loan affects the Net Present Value of the project (Table 14).

**Table 14: Summary showing Net present values (NPV) at different internal required return rates (IRR) in first three years of mine operations**

IRR (%)	NPV (US\$)
10	37,862,659
15	35,411,171

### 5.4 Changes in World Demand and the Project Supply of Coal

The project area has a large estimate of coal which most of it will be used in local industries. The world demand for coal is increasing due to the increasing demand for the industrial sectors. Coal markets today are very dynamic; a variety of qualities are traded; new price indexes have been created for different quality and in different regions.

### 5.5 Changing Discount Rate

The effect and trend of the Net Present Value if the Discount rate (R) were to change in the future show that there will be no drastic effects to the profitability of the project as the effects are dismal. It is very unlikely that the interest rate will rise to more than 50% during its life time.

## **5.6 Changing Price of coal**

The price of coal is one of the most cake parameter, which can severely increase the level of profitability of the project. It reflects the effect of price rise and fall on the Net Present Value of the Project.

This scenario indicates the very low level of investment risk, which the project carries, and the high potential the project has to generate positive cash flows over the entire project life. If tax exemption on fuel, oils, spare parts and other consumables were taken into account in this analysis, the break-even price of coal for this project would have been lower than indicated.

## **5.7 Debt Servicing**

It has been assumed that the project will secure a loan of US\$ 7,230,000 to fund for purchase of equipment and machinery in the pre-production period (considered as year 0 in our time scale). This loan will be serviced beginning year 1 to year 3, which is a period of 3 years. This loan will fetch a compound interest of 8%. When this 8% interest plus the loan recovery amount are scheduled over the 3-year period, each year the project will be required to remit to the bank amounts.

## CHAPTER SIX

### 6.0 CONCLUDING REMARKS

Marker Insight Limited represents a medium sized open pit coal project which provides a reasonable return on investment given the technical and economic assumptions presented in this study. While there are several areas of the project where further work is required to be undertaken during the detailed design phase, given the conservative approach taken where uncertainties exist, this work has the potential to result in the optimization of the project and improved cash flow projections compared to those given here. Coal project considers that there are remains potential to locate further resources and reserves following ongoing exploration and evaluation to optimizethe mining schedule and to obtain a portion of the water supply from boreholes.

It is important for the mine to invest on geotechnical data collection and analysis for proposed pit walls and waste dumps parameters, economic data collections (mining and washing costs), and washability tests to ensure quality coal that meets market requirement.

It is assumed basic equipment of excavator and trucks will be used for haulage, while wheel loaders and dozer as auxiliary facilities. Mining capacity will be solely dictated by coal demand as miningand stockpiling of coal do allow environment for endothermic reactions and hence fire. Only coalneeded for either washing or ready for market should be mined for stockpiles. Team for environmental management assuming acidic drainage, coal dusts and operations dusts are healthy and environmental risks envisaged. Quality control team and facilities, operations team with goodefficiency will allow the mine to achieve prominent goals. Very little of top soil is expected and hence immediately used. We anticipate by using covering infrastructures with overburden that canbehave as reclamation materials will allow

the top most surface to adopt top soil characteristics quickly and allow natural vegetation germination.

No TSF have been considered in this set-up as we do not expect enough tailings to justify establishment of the TSF. Little settled sediments can form cakes and being used for domestic cooking. Rejects and coal fines do usually have higher CV values that can be used for other economic uses including power plant feed.

Many of the economic assumptions on which the study will be changed since individual aspects of the work will be done. The effect of the changes in the price of coal on the project will, however, to some extent be cancelled out by the depreciation of the US dollar against most other currencies. As a result, the capital costs given in this report may be understated. Ruvuma Coal Limited is fully aware of these issues and plans to update the findings presented in this study to account for these changes.

Demand for coal is closely linked to general economic activity due to its uses in power generation, steel production, cement manufacturing and as a liquid fuel. Global demand for coal is still going through the roof. In 2013, coal added more primary energy than any other fuel and was the fastest-growing fossil fuel, at the same time 2013 coal demand grew 2.4% on a tonnage basis, more than oil and gas, enhancing its position as the second-largest primary energy source and closing the gap with oil. In 2014, coal oversupply persists and very low coal prices continued to dominate. For a few years, the focus of coal producers was to expand production. New capacity was constantly added and demand led by China consumed every additional ton. However, since 2011, oversupply and low prices have dominated. For the first time since the 1990s, global coal demand growth halted in 2014. This was the result of a combination of some structural and temporal factors, mostly in China, where half of global coal is used. Given the economic rebalancing in China and even with the continuation of growth in India, a downward trend in global coal consumption in 2015 is likely. Therefore, Coal markets today are very dynamic due to variety of qualities traded, new price indexes that have been created for different quality and in different regions. Despite of the dynamic of coal price in the world, the demand of coal in local market is high due to the transformation of local industries and Government to forbid importation of coal.

During development, a team with enough experience on coal quality assessment including geologists and open pit mining experienced especially on coal mining and planners should be considered to ensure they participate to ensure planned operation set-up is achieved. In view of the above, the project is thus feasible to be taken.

## Appendix 2

### Summary showing the investment plan for DARESA Coal mining project

<b>DARESA Coal Project (Investment Plan)</b>				
<b>FIXED ASSETS</b>	<b>Qty</b>	<b>Unit</b>	<b>Life Span</b>	<b>Total Project Cost (US\$)</b>
<b>PROJECT REQUIREMENTS</b>		<b>Rate (US\$)</b>	<b>Years</b>	
Land Factory	0	0	0	0
Land Mining	0	0	0	0
<b>Sub Total</b>				<b>0</b>
Excavators	2	500,000	10	1,000,000
Compressor	1	120,000	10	120,000
Wheel loader	2	360,000	10	720,000
Jack hammer	1	150,000	10	150,000
Drilling accessories	1	540,000	10	540,000
CAT D6 Dozer or Equivalent	2	440,000	10	880,000
Motor Grader	1	260,000	10	260,000
Mobile Lighting Plant	6	65,000	10	390,000
Standby Power Generator,250 KVA	1	220,000	10	220,000
15kL Water truck	1	130,000	10	130,000
Loading Trucks	3	90,000	10	270,000
Dumping trucks	5	186,000	10	930,000
Water bowser	1	50,000	10	50,000
Pit dewatering pumps	2	18,500	10	37,000
Reserve tanks	2	10,000	10	20,000
Bore Hole	1	3,000	10	3,000
Pick-ups	2	100,000	10	200,000
<b>Sub Total</b>				<b>5,980,000</b>
Feeder Breaker with Integrated Chain Conveyor	1	280,000	10	280,000
Belt Conveyor	5	14,000	10	70,000
Vibrating Classification Screen	2	1 50,000	10	290,000
Screen Chute, Pump Tank & Pump	1	180,000	10	180,000
Hydrocyclone Cluster	1	1 50,000	10	1 50,000

Spiral Block	1	55,000	10	55,000
Product Dewatering Screen	1	55,000	10	55,000
Pump Tank & Pump for Spiral Refuse	1	400,000	10	400,000
Coal Dewatering Screen	1	175,000	10	175,000

Refuse Dewatering Screen	1	190,000	10	190,000
Hutch Water Sump	1	35,000	10	35,000
Pump Sump & Pump	1	540,000	10	540,000
Thickener	1	900,000	10	900,000
Thickener Underflow Pump	1	140,000	10	140,000
Pump for Water Distribution	1	90,000	10	90,000
Instrumentation Package (Flowmeter, Belt Tares, etc.)	1	2 50,000	10	2 50,000
Control Cabinet	1	140,000	10	140,000
Steel Structure & Plate Works	1	180,000	10	180,000
Piping	1	50,000	10	50,000
Eletrical Appliances	1	20,000	10	20,000
<b>Sub Total</b>				<b>4,090,000</b>
Office furniture & fittings	2	3,500	10	7,000
Computers, photocopiers, printers, telephones	2	3,000	10	6,000
Light Vehicles	2	50,000	10	90,000
Security system & equipments	2	10,000	10	20,000
Kitchen ware and equipment	1	50,000	10	50,000
Reserve water (10,000L) tank	1	2,000	10	2,000
Communication system	2	10,000	10	20,000
Administration Office & Change House building	1	100,000	10	100,000
<b>Sub Total</b>				<b>295,000</b>
Safety Equipment and accessories	60	800	10	48,000
Mine Rescue equipment and accessories	2	13,000	10	26,000
<b>Sub Total</b>				<b>74,000</b>
Warehouse Equipments	1	25,000	10	25,000
Workshop equipment and tools	1	40,000	10	40,000
Survey equipment (Plotters, Total Station, & accessories)	1	80,000	10	80,000
Geology equipments	5	4,000	10	20,000
Fuel storage tanks & pumps	1	40,000	10	40,000
Fuel, lubricants and spare parts	1	100,000	10	100,000
Drilling Consumables	1	800,000	10	800,000
Electric power extension and transformer	1	36,000	10	36,000
Water supply system and control	1	30,000	10	30,000
Access roads construction	1	150,000	10	150,000
Gen set light 1 set	4	20,000	10	80,000
Laboratory Equipments	1	10,000	10	10,000
Mine Rehabilitation works and equipments	1	200,000	10	200,000
<b>Sub Total</b>				<b>1,611,000</b>
<b>Grand Total</b>				<b>12,050,000</b>

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### Appendix 3

#### Summary showing operational costs for at least 8 years of mine operations

3: Operating Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
	US\$	US\$	US\$	US\$	US\$	US\$	US\$	US\$
a) Production cost/Ton @ US\$ 10	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000
Royalty (3%)	567,000	567,000	567,000	567,000	567,000	567,000	567,000	567,000
Local GoT. Levies (0.3%)	56,700	56,700	56,700	56,700	56,700	56,700	56,700	56,700
Clearance (1%)	189,000	189,000	189,000	189,000	189,000	189,000	189,000	189,000
<b>Sub Total</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>	<b>812,700</b>
4: Utilities Costs								
b) Supportive services cost								
Warehouse Equipments	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Workshop equipment and tools	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Survey equipments	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Geology equipments	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Fuel storage tanks & pumps	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Electric power extension and transformer	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Water supply system	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Access roads construction	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Gen set light 1 set	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Laboratory Equipments	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Safety Equipment and accessories	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000
Mine Rescue equipment and accessories	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000
Mine Rehabilitation works and equipments	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
<b>Sub Total</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>	<b>735,000</b>

c) Administrative Overhead								
Bank, inventory proc. Cost and stationery	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
License and Legal fees	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Travelling & Accommodation (OUT)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Travelling & accommodation (TZ)	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Office Rent and other costs (DSM)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Fuel, oil and Lubricants for light vehicles	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Equipment Maintenance	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Building Repairs	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Consultancy fees	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Public relation and community support	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Medical and Health care cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Directors fees and board meetings	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Head office admin and comms costs	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Workers Canteen	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
<b>Sub Total</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>	<b>455,000</b>

d) Salaries								
Mining Engineer	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
Mine Foreman	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Driller	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Operator	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600
Loader Operator	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Truck Drivers	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000
Pickup 4WD driver	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Mechanical Foreman	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Electricians	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Mechanics	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Fitters	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Plumbers	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Welders	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Geologist	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
HSE Officer	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
HSE Attendants	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Medical Attendant	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Mine Manager	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Financial Manager	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Accountants	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
Public Relations officers	23,760	23,760	23,760	23,760	23,760	23,760	23,760	23,760
Secretary	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Supplies Officer	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Stores Clerk	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Messenger	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
security guards	19,440	19,440	19,440	19,440	19,440	19,440	19,440	19,440
<b>Sub Total</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>	<b>398,400</b>
<b>Grand Total Ops Costs</b>	<b>1,588,400</b>	<b>1588400</b>	<b>1588400</b>	<b>1,588,400</b>	<b>1,588,400</b>	<b>1,588,400</b>	<b>1,588,400</b>	<b>1,588,400</b>

## Appendix 4

Summary showing projected income and loss for at least 7 years of mine operations and also indicating the projected recoup of the project in the third year of mine operations

<b>PROJECTED INCOME AND LOSS STATEMENT (US\$)</b>								
<b>ITEM/YEAR</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>
<b>INCOME</b>								
COAL (Tons)	-	18,900,000	18,900,000	18,900,000	18,900,000	18,900,000	18,900,000	18,900,000
<b>TOTAL INCOME</b>	-	<b>18,900,000</b>	<b>18,900,000</b>	<b>18,900,000</b>	<b>18,900,000</b>	<b>18,900,000</b>	<b>18,900,000</b>	<b>18,900,000</b>
Direct Costs (Production Cost)	-	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000
Utilities Cost	-	1,588,400	1,588,400	1,588,400	1,588,400	1,588,400	1,588,400	1,588,400
<b>Total Operating Cost (Invariables)</b>	-	<b>6,088,400</b>	<b>6,088,400</b>	<b>6,088,400</b>	<b>6,088,400</b>	<b>6,088,400</b>	<b>6,088,400</b>	<b>6,088,400</b>
<b>Contribution Margin</b>	-	<b>12,811,600</b>	<b>12,811,600</b>	<b>12,811,600</b>	<b>12,811,600</b>	<b>12,811,600</b>	<b>12,811,600</b>	<b>12,811,600</b>
Less:								
<b>OPERATING OVERHEADS</b>								
Royalty (3%)		567,000	567,000	567,000	567,000	567,000	567,000	567,000
Local Government Levies (0.3%)		56,700	56,700	56,700	56,700	56,700	56,700	56,700
Clearance (1%)		189,000	189,000	189,000	189,000	189,000	189,000	189,000
<b>CAPITAL CHARGES</b>								
Short Term Loan	7,230,000	0	0	0	0	0	0	0
Interest short Term Loan	0	2,805,482	2,805,482	2,805,482	0	0	0	0
Total Capital Charges		640,580	640,580	640,580	640,580	640,580	640,580	640,580
<b>TOTAL OPERATING OVERHEADS</b>		<b>4,258,762</b>	<b>4,258,762</b>	<b>4,258,762</b>	<b>1,453,280</b>	<b>1,453,280</b>	<b>1,453,280</b>	<b>1,453,280</b>
<b>NET PROFIT BEFORE TAX</b>		<b>8,552,838</b>	<b>8,552,838</b>	<b>8,552,838</b>	<b>11,358,320</b>	<b>11,358,320</b>	<b>11,358,320</b>	<b>11,358,320</b>
<b>TAXATION (30%)</b>		<b>2,565,851</b>	<b>2,565,851</b>	<b>2,565,851</b>	<b>3,407,496</b>	<b>3,407,496</b>	<b>3,407,496</b>	<b>3,407,496</b>

<b>NET PROFIT AFTER TAX</b>		<b>5,986,986</b>	<b>5,986,986</b>	<b>5,986,986</b>	<b>7,950,824</b>	<b>7,950,824</b>	<b>7,950,824</b>	<b>7,950,824</b>
<b>GoT. FREE CARRIAGE (16%)</b>		<b>957,918</b>	<b>957,918</b>	<b>957,918</b>	<b>1,272,132</b>	<b>1,272,132</b>	<b>1,272,132</b>	<b>1,272,132</b>
<b>RETAINED EARNINGS</b>		<b>5,029,069</b>	<b>10,058,137</b>	<b>15,087,206</b>	<b>26,714,769</b>	<b>33,393,461</b>	<b>40,072,153</b>	<b>46,750,845</b>

## Appendix 5

Summary showing cash flow analysis and statement for at least 7 years of mine operations and also indicating projected Netcash inflows

<b>PROJECTED CASH FLOW STATEMENT</b>								
<b>ITEM/YEAR</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>
<b>INFLOWS</b>								
Equity Contribution	0	4,820,000	0	0	0	0	0	0
Short Term Loan	0	7,230,000	0	0	0	0	0	0
Overdraft Facility	0	0	0	0	0	0	0	0
Net Profit After Tax & GoT Free Carriage	0	5,029,069	10,058,137	15,087,206	26,714,769	33,393,461	40,072,153	46,750,845
Economic Depreciation	0	640,580	640,580	640,580	640,580	640,580	640,580	640,580
<b>TOTAL CASH INFLOWS</b>		<b>17,719,649</b>	<b>10,698,717</b>	<b>15,727,786</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>	<b>47,391,425</b>
<b>OUTFLOWS</b>								
Invest		12,050,000						
Loan Repayment		2,805,482	2,805,482	2,805,482	0	0	0	0
Change in Working Capital		0	0	0	0	0	0	0
<b>TOTAL OUTFLOWS</b>		<b>14,855,482</b>	<b>2,805,482</b>	<b>2,805,482</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>NET CASH INFLOWS</b>		<b>2,864,166</b>	<b>7,893,235</b>	<b>12,922,303</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>	<b>47,391,425</b>
<b>COMMULATIVE CASH INFLOWS</b>		<b>2,864,166</b>	<b>7,893,235</b>	<b>12,922,303</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>	<b>47,391,425</b>

## Appendix 6

Summary showing projected balance sheet for at least 7 years of mine operations and indicating total resources for the entire life of mine (LOM)

<b>PROJECTED BALANCE SHEET(US\$)</b>								
<b>ITEM/YEAR</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>
Fixed Assets at Cost		12,050,000	12,050,000	12,050,000	12,050,000	12,050,000	12,050,000	12,050,000
Less: Accumulated Depreciation		640,580	640,580	640,580	640,580	640,580	640,580	640,580
<b>NET BOOK VALUE</b>		<b>11,409,420</b>	<b>11,409,420</b>	<b>11,409,420</b>	<b>11,409,420</b>	<b>11,409,420</b>	<b>11,409,420</b>	<b>11,409,420</b>
<b>CURRENT ASSETS</b>								
Cash and Bank Balances		2,864,166	7,893,235	12,922,303	27,355,349	34,034,041	40,712,733	47,391,425
Stock/Debtors		0	0	0	0	0	0	0
<b>TOTAL CURRENT ASSETS</b>		<b>2,864,166</b>	<b>7,893,235</b>	<b>12,922,303</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>	<b>47,391,425</b>
<b>CURRENT LIABILITIES</b>								
Trade Creditors		0	0	0	0	0	0	0
Bank Overdraft Facility		0	0	0	0	0	0	0
<b>TOTAL CURRENT LIABILITIES</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>NET CURRENT ASSETS</b>		<b>2,864,166</b>	<b>7,893,235</b>	<b>12,922,303</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>	<b>47,391,425</b>
<b>TOTAL ASSETS</b>		<b>14,273,586</b>	<b>19,302,655</b>	<b>24,331,723</b>	<b>38,764,769</b>	<b>45,443,461</b>	<b>52,122,153</b>	<b>58,800,845</b>
<b>Represented By</b>								
Owner's Equities	4,820,000	4,820,000	4,820,000	4,820,000	4,820,000	4,820,000	4,820,000	4,820,000
Retained Earnings	0	5,029,069	10,058,137	15,087,206	26,714,769	33,393,461	40,072,153	46,750,845
<b>NET WORTH</b>	<b>4,820,000</b>	<b>9,849,069</b>	<b>14,878,137</b>	<b>19,907,206</b>	<b>31,534,769</b>	<b>38,213,461</b>	<b>44,892,153</b>	<b>51,570,845</b>
Short Term Loan Due	7,230,000	0	0	0	0	0	0	0
<b>TOTAL RESOURCES</b>	<b>12,050,000</b>	<b>9,849,069</b>	<b>14,878,137</b>	<b>19,907,206</b>	<b>31,534,769</b>	<b>38,213,461</b>	<b>44,892,153</b>	<b>51,570,845</b>

## Appendix 7

Summary showing projected discounted cash flow indicating the viability of the DARESA Coal project for at least seven years of mine operations

<b>PROJECTED DISCOUNTED CASHFLOW (US\$)</b>							
<b>ITEM/YEAR</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>	<b>US\$</b>
<b>Inflows</b>							
Profit After Tax and GoT. Free Carriage	0	5,029,069	10,058,137	15,087,206	26,714,769	33,393,461	40,072,153
Capital Charges	0	640,580	640,580	640,580	640,580	640,580	640,580
Salvaged Value	0	0	0	0	0	0	0
Recovery of Working Capital	0	0	0	0	0	0	0
<b>TOTAL INFLOWS</b>	<b>0</b>	<b>5,669,649</b>	<b>10,698,717</b>	<b>15,727,786</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>
<b>Outflows</b>							
Investment & Re-Investment	12,050,000	0	0	0	0	0	0
Working Capital (Inc/Decrease)	0	0	0	0	0	0	0
<b>TOTA OUTFLOWS</b>	<b>12,050,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>NET CASH FLOWS</b>	<b>12,050,000</b>	<b>5,669,649</b>	<b>10,698,717</b>	<b>15,727,786</b>	<b>27,355,349</b>	<b>34,034,041</b>	<b>40,712,733</b>
Discounting Factor at 15%	1	0.869565217	0.756143667	0.657516232	0.571753246	0.497176735	0.432327596
Discounting Factor at 10%	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	0.56447393
PV (15%)	<b>12,050,000</b>	<b>4,930,129</b>	<b>8,089,767</b>	<b>10,341,274</b>	<b>15,640,509</b>	<b>16,920,933</b>	<b>17,601,238</b>
PV (10%)	<b>12,050,000</b>	<b>5,154,226</b>	<b>8,841,915</b>	<b>11,816,518</b>	<b>18,684,071</b>	<b>21,132,462</b>	<b>22,981,276</b>
<b>NPV (Three Yrs) @ 15%</b>	<b>35,411,171</b>						
<b>NPV (Three Yrs) @ 10%</b>	<b>37,862,659</b>						