# ENVIRONMENTAL PROJECT BRIEF

# FOR THE PROPOSED FEEDER ROADS REHABILITATION IN LUNDAZI DISTRICT

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ADSP | Agricultural Development Support Project |
| AIDS | Acquired Immune Deficiency Syndrome |
| AMSL | Above Mean Sea Level |
| ARAP | Abbreviation Resettlement Action Plan |
| BAT | Best Available Technique. |
| BPEO | Best Practicable Environmental Option |
| BFS | Bankable Feasibility Study |
| BOQ | Bills of Quantities |
| CBO | Community Based Organisation |
| CSO | Central Statistical Office |
| ECZ | Environmental Council of Zambia |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| EMP | Environmental Management Plan |
| EPB | Environmental Project Brief |
| EPPCA | Environmental Protection and Pollution Control Act |
| GIS | Geographic Information System |
| GMAs | Game Management Areas |
| GRZ | Government of the Republic of Zambia |
| GPS | Global Positioning System |
| GW | Groundwater |
| IDA | International Development Association |
| IUCN | International Union for the Conservation of Nature |
| Km | Kilometre |
| LDC | Lundazi District Council |
| LHS | Left Hand Side |
| LEAD | Leadership for Environment and Development |
| MACO | Ministry of Agriculture and Cooperatives |
| MTC | Ministry of Transport and Communications |
| NGO | Non-Governmental Organisation |
| NHCC | National Heritage Conservation Commission |

| | |
|---|---|
| NIOSH | National Institute of Occupational Safety and Health |
| OHS | Occupational Health and Safety |
| NPE | National Policy on Environment |
| PFA | Protected Forest Area |
| PPE | Personal Protective Equipment |
| PRA | Participatory Rural Appraisal |
| QA/QC | Quality Assurance/Quality Control |
| RDA | Road Development Agency |
| RRIF | Rural Roads Improvement Facility |
| SDPRU | Sustainable Development & Poverty Reduction Unit |
| SI | Statutory Instrument |
| STD | Sexually Transmitted Disease |
| SHE | Safety Health and Environment |
| SEA | Strategic Environmental Assessment |
| WB | World Bank |
| ZABS | Zambia Bureau of Standards |
| ZAWA | Zambia Wildlife Authority |
| ZESCO | Zambia Electricity Supply Company |
| ZMK | Zambian Kwacha |

## EXECUTIVE SUMMARY

The Government of the Republic of Zambia (GRZ) in its quest to commercialise smallholder farming will upgrade and improve the Rural Roads network with support from the World Bank through the Agricultural Development Support Project (ADSP). The key objective of the project is to commercialise smallholder agriculture by, among other things, encouraging innovation, improvement to road infrastructure in the district, out growers and smallholder commercial farming through schemes.

The Rural Roads Improvement Facility (RRIF) is implemented by the Road Development Agency (RDA) and providing resources for the rehabilitation and maintenance of a network of feeder roads in Lundanzi District, Eastern Province of Zambia. A total road net work of approximately 308.87 km is earmarked for rehabilitation, improvement and maintenance. The focus is on improving the Core Road Network for increased agricultural production and improved agricultural marketing activities.

In 2008 an output and performance based road contract number TB/CE/002/08-213 for package 4 was given to Jiangx Zhongmei Engineering Construction Limited to carry out the project. The study involved undertaking a detailed Environmental Project Brief in accordance with the Environmental Protection and Pollution Control Act, Cap 204 of the Laws of Zambia.

The Government of the Republic of Zambia has received a grant from World Bank towards the cost of the project to support Agricultural Development Support Project and intend to apply a portion of this grant to payments of this sub-project.

## Description of the Project Area

The project area is in Lundazi District in Eastern Province. The roads earmarked for rehabilitation as per contract for package 4 consist of the following:

D109 Lundazi – Malawi Border
R237 Chasefu (RD 107) – Magodi (D103)
R239 Emusa (RD 107) – Magodi (RD 103)
R242 Hoya School (D103) – Nyalubanga School (R243)
R243 Mphamba (D104) - Nyalubanga (D103)
R251 Mwase (RD 110) – Pono
R252 – 253 Mwase (R251) – Chamugwishila - Mwase (RD 110)
R254 Gwaba (R110) – Kamtande
Emusa (RD 107) – Chasefu (D103)
RD 110 Lundazi (M12) – Mwase
RD 110N D109 - Kapachila – Mwase (RD110)
U16 Gwaba (R254) – TBZ – Lundazi (M12)
U 21 Kanyuka – Chigonga.

## Objective of the Project

The objective of the project is to improve and rehabilitate rural road network in Lundazi District to facilitate marketing of farm produce and improve accessibility and connectivity.

## Objective of the EPB

The main objective of the EPB is to examine impacts on ecological units and ecological processes of the project area including impacts on physical, biological, socio – economics, socio-cultural and archaelogical environment and to propose mitigation measures for identified adverse impacts of the road rehabilitation project.

## Zambian Law and the World Bank Environmental and Social Safeguard Policies

The World Bank safeguard policies are operational policies whose primary objective is to ensure that the World Bank funded operations do not cause adverse social and environmental impacts and that they “do no harm”. The road project must comply with the requirement of the Safeguard Policies, the Pollution Prevention and Abatement Handbook and World Bank Group Environmental, Health and Safety Guidelines.

## Expected Road Rehabilitation Works

The proposed scope of work will include site clearance and preparation of the construction platform; establishment of borrow pits, reshaping to re-establish the required cross section; re-gravelling, lining of drains; replacing or construction of new drainage structures; installation of road signs and marker posts.

## Potential Impacts and Mitigating Measures

Road rehabilitation is likely to cause both positive and Negative Impacts. The major environmental impacts have been identified.

## Positive Impacts

- Creation of Employment opportunity during the construction phase.
- the rehabilitation of the road will provide quick access to the market for farm produces and quick delivery of inputs like maize seed and agricultural chemicals - Improved access to market:.
- Increased trade opportunities in the community due to increased population during the project cycle.
- Improved road network.
- Increased revenue for local authorities and institutions from communications, land rate, licenses and personal levy.

**Negative Impacts**

- Increased air pollution from vehicles emissions (hydrocarbons, carbon dioxide, and carbon monoxide) due to increased traffic.
- Increased noise nuisance both during construction and operations phases.
- Irreversible environmental destruction from construction activities such as deforestation, borrow pit digging and camping site for construction workers.
- Road Safety: improved road infrastructure will result in increased road safety risk for the local communities.
- Loss of fruit trees: the rehabilitation of the road will led to the loss of planted and mature fruit trees situated within the road reserve area.
- Loss of livelihood: the rehabilitation of the road will lead to Relocation and Resettlement of some people.
- Littering domestic refuse and sewerage waste from construction camps.
- Land pollution: oil and gasoline spills from construction equipment and plant maintenance activities.
- Occupational Health and Safety; constructions equipment and borrow pits can result in accidents to both the workers and the local communities.

**Environment Management Plan (EMP) and Abbreviated Resettlement Action Plan (ARAP)**

An Environmental Management Plan has been elaborated upon. The plan comprises elements to be incorporated in the detailed design of the project.

**Conclusion and Recommendation**

The findings from the study indicated that the socio-economic benefits of the improved road network to the communities in the project area outweigh the negative impacts. The project is therefore being recommended for implementation provided that the recommended mitigating measures are implemented as outlined in this EPB.

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# 1.0 INTRODUCTION

## 1.1 BACK GROUND

Huachang Infrastructure Engineering (Z) Limited is a growing engineering company whose principal activities include Civil, Structural and General Engineering Contractors. It is 100% owned by Huachang Infrastructure Engineering.

The company has signed an agreement contract with Road Development Agency (RDA) for execution of the Output and Performance based Road Contract (OPRC) for package 4 Lundazi District in Eastern Province of Zambia.

The proposed scope of work will include site clearance and preparation of the construction platform; establishment of borrow pits, reshaping to re-establish the required cross section; re-gravelling, lining of drains; replacing or construction of new drainage structures; installation of road signs and marker posts.

The Project investment cost is ZMK 38, 755, 853, 690. 00 (Zambian Kwacha Thirty Eight Billion, Seven Hundred and Fifty–five Million, Eight Hundred and Fifty-three Thousand, Six Hundred and Ninety only).

## 1.2 REASON FOR THE PROJECT

The Government of the Republic of Zambia (GRZ) in its quest to commercialise smallholder agriculture will upgrade and improve the Rural Roads network with support from the World Bank through the Agricultural Development Support Project (ADSP). The key objective of the project intends to support among other things improvement to Road Infrastructure through Rural Roads Improvement Facility (RRIF) in the District.

The Rural Roads Improvement Facility (RRIF) is implemented by the Road Development Agency (RDA) and providing resources for the rehabilitation and maintenance of a network of feeder roads in Lundazi District, Eastern Province of Zambia. A total road network of approximately 308.87 km is earmarked for rehabilitation, improvement and maintenance. The focus is on improving the Core Road Network which has been identified as improved agricultural production and increased agricultural marketing activities. These feeder roads are of importance for:-

i. The transport system in the districts and the province in general.
ii. Maintaining the linkage of the transport network system of Eastern Province.
iii. Transportation of farm products and associated service infrastructure to and from other areas.
iv. Supporting livelihoods of the people in various ways.

## 1.3 SCOPE OF STUDY

The Environmental project Brief (EPB) study adheres to the requirements of the Environmental Impact Assessment (EIA) regulations of the Environmental Protection and Pollution Control Act (EPPCA) of 1990. The EIA regulations demand that socio -economic and environmental impacts consequential to the construction and operation of the project are assessed well in advance. Huachang Infrastructure Engineering Zambia Limited commissioned the development of an Environmental Project Brief to assess the baseline, environmental trends and socio-economic data of the project area, identify significant environmental and socio-economic impacts of the project and propose possible mitigation measures. This study addresses positive as well as negative impacts and recommends measures for mitigating negative environmental impacts.

## 1.4 OBJECTIVE OF THE PROJECT

The sub-projects' main objective is to improve and rehabilitate the road network in Eastern Province so as to bring the roads to maintenance and manageable level to speed up socio-economic development in Lundazi District, Eastern Province.

## 1.5 STUDY METHODOLOGY

The study was undertaken to obtain the views and concerns of the interested and affected parties i.e. local authority and local tradition leaders. The following steps were involved in the process:

(i) Consultative discussions with local authority, stakeholders, local traditional Leaders and interested parties in the immediate environment of the Project;
(ii) Review of relevant legislation;
(iii) Review of environmental literature; and
(iv) Identification of significant environmental impacts and development of mitigating measures.

Responses from consultations and data from literature provided the significant environmental impacts and helped in the development of an environmental management and monitoring plan.

## 2.0 REVIEW OF RELEVANT LEGISLATION

The following are some of the pieces of Legislation related and relevant to the development of the project which the developer will comply with.

### 2.1 Environmental Protection and Pollution Control Act (EPPCA)

This is the principal Act governing and regulating environmental issues in Zambia and was passed in 1991. The Act's main functions include the protection of the environment and control of pollution in particular so as to provide for the health and welfare of people, animals, plants and the environment in general;

Roads projects are outlined in the Environmental Impact Regulations SI No. 28 of 1997, Schedule (Regulations (7) (2)) Section 2 (a) under the leading, transportation:), the regulation states that All major roads outside urban areas, the construction of new roads and major improvements of roads that passes through a National Park or Game Management Area shall require an Environmental Impact Assessment.

In this project, the rehabilitation works will be done along the existing small roads and the roads do not pass through a National Park (NP) of Game Management Area (GMA).

However, in some project areas there are villages that have settled too close along these roads which will result in relocation and resettlement of people. The resettlement will be done in accordance with the Abbreviated Resettlement Action Plan (ARAP) which has been prepared within the frame work of the Laws of Zambia and World Bank regulation.

Below are the subsidiary Statutory Instruments of the EPPCA that are relevant to the Project:

2.1.1 Statutory Instrument No. 71 of 1993 – Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations – provides for licensing of solid non-hazardous waste transportation and operating/owning of a non-hazardous waste disposal site.

Road rehabilitation and construction activities have the potential to generate solid waste whose transportation and disposal may require licensing. Managing of all solid waste should therefore have to be done in accordance with the requirement of these Regulations.

2.1.2 Statutory Instrument No. 72 of 1993 – Water Pollution Control (Effluent and Wastewater) Regulations – provides for licensing of liquid waste discharge to the environment and also provides for statutory discharge limits for respective parameters.

Road rehabilitation and construction activities have the potential to cause leakages, oil spill or wash pollutants into the nearby aquatic environment. Therefore, management of the site should take into account the need to prevent pollution of the aquatic environment.

2.1.2 Statutory Instrument No. 20 of 1994 – Pesticides and Toxic Substances Regulations – provides for licensing of importation, transportation, distribution, storage and disposal of pesticides and toxic substances.

Road rehabilitation and construction activities may spill chemicals that have the potential to pollute soil and water, therefore, the developer will be required to take mitigation measures to prevent soil and water pollution.

2.1.3 Statutory Instrument No. 141 of 1996 – Air Pollution Control (Licensing and Emission Standards) Regulations – provides for licensing of gaseous waste emission to the environment and also provides for statutory discharge limits for respective parameters.

Road rehabilitation and construction activities may discharge particles and dust that have the potential to pollute ambient air, therefore, the developer will be required to take mitigation measures to prevent pollution of the ambient air.

2.1.4 Statutory Instruments No. 28 of 1997 – Environmental Impact Assessment Regulations – provides the framework for conducting and reviewing environmental impact assessment for any project. Further to that, it provides regulations for auditing project implementation.

Road rehabilitation and construction activities fall within the category of projects that require a project brief in terms of Regulations (3) (2), First Schedule of Projects.

2.1.5 Statutory Instrument No 125 of 2001 – Hazardous Waste Management Regulations – provides for licensing of solid hazardous waste transportation and operating/owning of a hazardous waste disposal site.

Therefore generation, collection storage, transportation, pre-treatment and disposal of hazardous waste resulting from road rehabilitation and construction activities may require to be licensed under these Regulations.

## 2.2 Pneumoconiosis Act

This Act (No. 13 of 1994) provides for the requirement for Certificates of Fitness for all employees that work in restricted dust areas – working places where free silica in the reparable dust with particle size less than 5 microns is harmful to humans if inhaled over a period of time.

## 2.3 The National Heritage Conservation Act (CAP 173)

The Act was enacted in 1989 and established the National Heritage Conservation Commission (NHCC). The Act provides for the Conservation of Ancient, Cultural and Natural Heritage, relics and objects of aesthetic, historical, pre-historical, archaeological or scientific interest by preservation, restoration, rehabilitation, reconstruction, adaptive use and good management. Thus in case of any occurrence or suspicious of such should be handled in accordance with the mentioned Act.

## 2.4 The Zambia Wildlife Act No. 12 of 1998

Enacted in 1998, the Act provides for the conservation and management of ecosystems to preserve them from the impacts of anthropogenic activities. The Act also regulates the type and extent of tourism activities that may be permitted in a National Park or Game Management Areas (GMAs).

## 2.5 The Water Act of 1949 (CAP 312)

The Act provides for the control, ownership and use of water excluding the water of the Zambezi, Luapula and Luangwa rivers that form borders with other countries. The Act establishes the Water Board and regulates the use of public water including against pollution. Closely associated with the Water Act is the Water Policy of 1994 which regulates the importance of water for public health, food production and industry, production of energy, the natural environment and other important aspects that enhance the quality of life such as transportation, recreation and tourism.

## 2.6 The Public Health Act of 1930

It provides for the prevention of diseases, drainage, latrine and disposal of sewerage and treatment systems.

## 2.7 The Land Act of 1995 and Land Acquisition Act of 1970

### 2.7.1 The Land Act of 1995

The Land Act of 1995 was enacted to guarantee peoples' right to land while enhancing development. The Act recognises the holding of land under customary tenure and the Chief's role has been legally recognised, such that land cannot be converted or alienated without approval of the Chief.

### 2.7.2 The Lands Acquisition Act No. 2 of 1970

Land acquisition is governed by the Lands Acquisition Act No. 2 of 1970. The Act sets out regulations for compulsory acquisition of land and property and compensation for such acquisition. The president (his designated and authorized person) may acquire any property in the interest of the Republic. Notice shall be given in person not less than two months in advance and shall be gazetted.

Compensation for acquired property, losses and damages shall be paid as may be agreed or, finally determined by the National Assembly in case agreement on compensation is not reached within six weeks after publication in the Gazette.

## 2.8 The Investment Act

Enacted in 1993, the Act provides a legal framework for investment in Zambia. The Act relates to the environment indirectly by providing incentives for tree planting, soil and water conservation activities. The Act further recognizes the role of other agencies including those responsible for environmental protection in authorities' specific projects.

## 2.9 The Local Government Act

Enacted and implemented in 1991, the Act provides for the establishment of Councils or Districts, the functions of local authorities and the local government system. Some of these functions relate to pollution control and the protection of the environment in general.

## 2.10 The Town and Country Planning Act of 1962

The Act provides for the appointment of planning authorities whose main responsibilities are the preparation, approval and revocation of development plans. It also provides for the control of development and subdivision of land.

## 2.11 Forest Act, Cap 199

The Forest Act, passed in 1974, provides for the establishment and management of National and Local forests, conservation and protection of forests and trees, and licensing and sale of forest products. The Act prohibits the felling, collecting or injuring of forest products in protected forest areas or forest reserves, unless a license has been obtained to do so. It also prohibits excavation, construction, and operation of machinery within the forest reserves or protected areas.

Forest reserves currently cover approximately 10% of the country and are intended for the conservation and development of forest resources, as well as providing protection to watersheds.

The Act also provides for the protection of 7 tree species nationally whether in a protected area or out side it. These are:-

| **Scientific Name** | **Local Name** |
|---|---|
| *Parinari curatellifolia* | Mpundu |
| *Anisophyllea boehmii* | Mufungo |
| *Pterocarpus angolensis* | Mulombwa/African Teak |
| *Entanddrophragma delevoyi* | Mofu |
| *Faurea saligna* | Saninga |
| *Khaya nyasica* | Muhulu |
| *Julbernardia globiflora* | Mupasa |

## 2.12 Road Traffic Act NO. 11 0F 2002

The Act established the Road Transport and Safety Agency and to define its function; to provide for a system of roads safety and traffic management. The Road Traffic Act was amended and assented to (second schedule and repeal and replacement of section 37) on 1 April 2006.

## 2.13 Petroleum Act, Cap 439

The areas of the Petroleum Act of relevance to this project are regulations for the conveyance and storage of petroleum, inflammable oil and liquids e. g. paraffin.

## 2.14 Mines and Minerals Act, Cap 213

This Act regulates mining activities and operations and provides for regulations for environmental protection during prospecting and mining activities and rehabilitation of the areas mined. The Ministry of Transport and Communications (MTC) Environmental guidelines state that the Mines and Minerals Act supports the following requirements of the guidelines for borrow areas and quarry pits.

Section 7.6 (p61) of the MTC Environmental Guidelines states that through environmental impact assessments and audits, mine dump reporting, storage areas, handling of hazardous materials and contributions of the Environmental Protection Fund

*"Contractors shall obtain licences from the Ministry of Mines to operate borrow areas"*

and 7.10(6) (p63) states that:-

*"Contractors shall obtain mining licences for quarrying".*

## 2.15 World Bank Environmental Assessment (OP 4.01)

### b) Applicability

The policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts in its area of influence.

### a) Objective

The objective of the policy is to ensure that Bank financed projects are environmentally and socially sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental and socio impacts.

The policy covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans-boundary and global environment concerns. EA considers natural and social aspects in an integrated way. Particular social aspects (involuntary resettlement, indigenous people) as well as issues of natural habitants, pest management, forestry, and safety of dams are covered by separate policies with their own requirements and procedures. However, the environmental assessment process provides insight to ascertain the applicability of other safeguard policies to specific projects. This is especially the case for policies on natural habitats, pest management, and physical cultural resources that are typically considered within the EA process.

The policy describes an environmental assessment (EA) process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examine project alternatives; identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The policy favours preventive measures over mitigatory or compensatory measures whenever feasible.

In Road Projects, all sub-projects are being screened in the earliest stages of their preparation to ensure compliance with the policy and ascertain whether other safeguard policies are triggered. The sub-projects are being screened not only for their direct impacts but also for indirect and cumulative impacts. Based on the screening, sub-project are be assigned a category A, B or C.

Category A will be assigned to sub-projects with anticipated significant adverse environmental impacts that are sensitive, diverse or unprecedented. For these sub-projects, full EA (EIA, according to Zambian law) will be required.

Category B will be assigned to sub-projects with anticipated specific adverse environmental impacts are less adverse than in category A. For these sub-projects, an Environmental Analysis limited to the specific environmental impacts of the sub-project will be required (EPB according to Zambian Law). Category C will be assigned to sub-projects with anticipated minimal or no adverse environmental impacts. For these projects, no further environmental review beyond environmental and social screening will be required.

# 3.0 DESCRIPTION OF THE PROJECT

The proposed scope of work will include site clearance and preparation of the construction platform; establishment of borrow pits; reshaping to re-establish the required cross section; re-gravelling, lining of drains; replacing or construction of new drainage structures; installation of road signs and marker posts.

## 3.1 Project Activities

### 3.1.2 Preparation Phase

Preparation phase will involve the following

- Planning and designing.
- Establishment of construction team.
- Establishment of borrow pits.
- Taking construction equipment to site
- Site clearance and preparation of the construction platform

### 3.1.3 Construction Phase

Construction Phase will include:

Excavation and loading of materials.
Transportation of materials.
Reshaping to re-establish the required cross section;
Re-gravelling, lining of drains;
Construction of new drainage structures;
Installation of road signs and marker posts.

### 3.1.4 Raw Materials

Laterite/Calcrete or natural gravel from borrow pits.

### 3.1.5 Project Consumables

Project Consumables include:-

- Diesel
- Lubricants (oils)
- Equipments spare parts
- Lubricants
- Water

## 3.2 Project Equipment

- Excavators
- Front end loaders.
- Tipper trucks

## 3.3 Operation Phase

### 3.3.1 Borrow Pits Activities

Borrow pits will provide the construction materials which are either laterite/calcrete or natural gravel and will involve clearing of sites, excavation, loading of material and transportation to construction points.

- Using of the road and;
- Periodical road maintenance.

## 4.0 Site Alternatives

No site alternatives were identified, as the project sites were within the already existing roads.

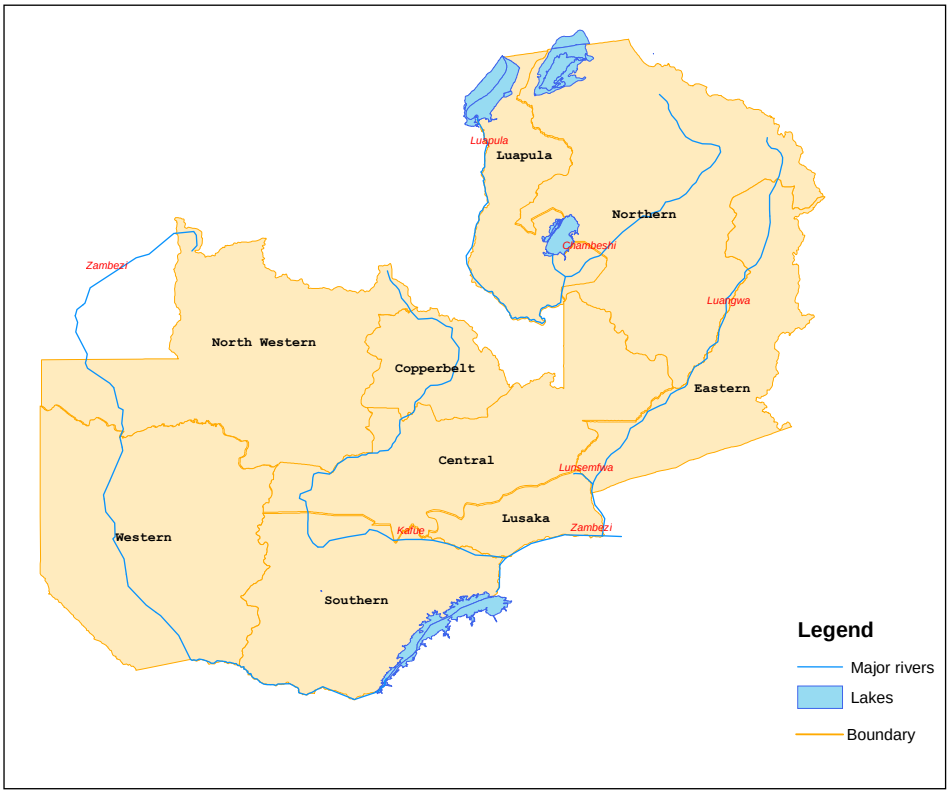
## 5.0 Description of Site Environment

### 5.1 Project Location

The project sites are located in Lundazi District in Eastern Province of Zambia. The proposed roads to be upgraded and rehabilited are:-

D109 Lundazi – Malawi Border, R237 chasefu (RD 107) – Magodi (D103), R239 Emusa (RD 107) – Magodi (RD 103), R242 Hoya School (D103) – Nyalubanga School (R243), R243 Mphamba (D104) - Nyalubanga (D103), R251 Mwase (RD 110) – Pono, R252 – 253 Mwase (R251) – Chamugwishila - Mwase (RD 110), R254 Gwaba (R110) – Kamtande, Emusa (RD 107) – Chasefu (D103), RD 110 Lundazi (M12) – Mwase, RD 110N D109 - Kapachila – Mwase (RD110) , U16 Gwaba (R254) – TBZ – Lundazi (M12), U 21 Kanyuka – Chigonga in Lundazi District, Eastern Province of Zambia.

Plate 1: **Map of Zambia showing provincial boundaries and main Rivers.**



## 5.2 Climate

The Project area experiences cool-dry (May to August), hot-dry (September to October) and hot-rain (November to April) seasons. The total annual average rainfall is around 1,184 mm. In hot months of September and October, the average temperature of 34.5$^{o}$C. Wind direction is mainly from East to West. The mean monthly wind speeds vary from 1.3 m/sec in February to 3.5 m/sec in July. The average rainfall days is 92 (max. 115 and min. 70). (Source, State of Environment in Zambia 2004).

## 5.3 Geology

The regional geology of the project area is dominated by multiple re-worked metagranites, metavolcanic and metasedimentary units of Achaean to Mesoproterozoic age which together make up the northeast trending Mesoproterozoic Irumide Belt. The main rock formation is the Mozambique belt with main rock types including granite, conglomerates and dolomite.

## 5.6 Topography

The natural topography of the area is generally flat and is typical of the Central African plateau. The Project area lies between 1280m and 1520m above mean sea level (amsl).

## 5.7 Soils

The main soil type are Oxisols. In the FAO soil classification, oxisols are known as *ferralsols* consisting of mixtures of kaolinite and quartz, which are low in weatherable minerals. These soils are usually deep, well-drained red or yellow soils with excellent granular structure, very low fertility, and uniform properties with depth.

## 5.8 Flora

*Base condition* - The project area has mainly short grass partly localized trees in some areas. Therefore, vegetation will be removed from some areas to pave way for the construction of the roads.

### 5.8.1 Natural Resources Based Activities

The Lundazi Area is habitat to wild fruits, mushroom and tree species for charcoal production. Important livelihood activities related to exploitation of natural resources include collection of wild fruit and mushrooms while suitable species for charcoal production are also exploited. Farming is a major economic activitity carried out by the majority of the people.

## 5.9 Fauna

The project area has previously been disturbed as evidenced by existing old roads. Therefore, the area has few animals and birds due to the destruction of habitats and sanctuaries respectively.

## 5.10 Hydrology

The main water courses within the project area are seasonal streams. The streams and natural water ways are important to the local people as most of them have to draw drinking water from this water course.

## 5.11 Archaeological and Cultural Sites

The Project site was assessed and no sites of archaeological, cultural or heritage interest were identified. However, should any ancient heritage, relics or anything that might or believed to be of archeological of historical importance during the execution of works, such findings shall be reported to the National Heritage Conservation Commission (NHCC) in accordance with the Act and outlined measures aimed at protecting the historical or archeological resources.

## 5.12 Socio –economic

**5.12.1 Farming:** Rain fed crop production is the major livelihood activity. Main crops grown include maize, groundnuts, cowpeas, sorghum, sweet potatoes, beans, cotton and sunflower. Cotton is grown as cash crop under the Out-Grower Scheme by Dunavant Zambia Limited.

### 5.12.2 Trading

Road side vending in livestock and Livestock products, agricultural produce, charcoal and mushroom selling.

### 5.12.3 Live Stock Production

Livestock production is another important livelihood activity carried out by the local people. Animals reared include cattle, goats, pigs, and poultry.

### 5.12.4 Telecommunication Services

MTN and Zain networks are accessible in some parts of the roads. However, mobile networks are scantly available once you enter the proposed sites

.

### 5.12.5 Road Network

The road network in Lundazi is mainly gravel roads.

Plate 2: Current existing Roads.

## 6.0 Decommissioning Plan for the Borrow pits

The project will try to rely on existing borrow pits. Where new borrow pits are to opened these shall not be sited near the sensitive environs that is to say near communities, cultural site and water bodies. However, road construction waste may be used for rehabilitation of the borrow pits. The developer will be committed to developing and implementing a closure plan for all aspects of borrow pits and quarry operations to ensure that rehabilitation and final closure of the sites meet clearly defined objectives aimed at minimizing long term environmental impacts.

## 6.1 Borrow pit details and Materials Test results

Borrow pits have been identified this included inspection, sampling, testing and analysis for type, quality and availability of construction materials within the project area.

### Table 1: Showing Borrow Pit Details

| Road | KM | Type | Remarks |
|---|---|---|---|
| | | | |
| RD108 | 32.27 | New | RHS |
| R256 | 5.58 | Existing | RHS + LHS |
| R251 | 1.30 | Existing | LHS |
| R251 | 16.50 | New | LHS |
| RD107 | 11.30 | New | RHS |
| RD108 | 0.00 | New | LHS |
| R237 | 0.15 | New | RHS +LHS |
| R239 | 3.30 | New | RHS |
| R242 | 0.00 | New | RHS + LHS |
| R256 | 5.42 | New | RHS |
| R243 | 13.48 | New | LHS |
| R243 | 24.99 | New | RHS |
| R242 | 16.20 | New | RHS |
| R252-253 | 15.17 | New | RHS + LHS |
| R254 | 9.56 | New | RHS + LHS |
| R256 | 12.00 | New | RHS |
| R255 | 0.00 | New | LHS |
| U21 | 3.09 | New | RHS |

# 7.0 Negative impacts

## 7.1 Impacts on Landscape and Aesthetics

During construction phase, a number of borrow pits along the route will be opened up. Potential impacts include clearing of vegetation and landscaping will distort the natural landscape and may degrade areas of scenic beauty.

## 7.2 Soil Erosion and River Siltation

Borrow pit activities and Vegetation clearing for stockpiles as well as reshaping during detour, access roads and camp site construction will become prone to soil erosion during rainy season and might result in increased suspended solids in nearby streams.

## 7.3 Disturbance of Flora and Fauna

The noise from construction equipment and vegetation clearing may disturb the flora and fauna.

## 7.4 Air Pollution

Construction equipment may impact on local air quality (vehicle exhaust emissions and dust generation) and cause local noise and vibration disturbances.

During construction phase large amounts of soil will be excavated and transported. The equipment for excavation and transporting sand will generate dust emissions to the air in the form of exhaust fumes and dust.

## 7.5 Noise

During the construction phase heavy machinery will be used for excavation, transportation, placements and compaction of soil. Extraction of construction materials from borrows pits using excavators could generate noise and impact on the nearby communities.

## 7.6 Water Pollution

During construction phase, the bridges, road side drains and culverts will require cleaning and reshaping. Some of the drains might be prone to soil erosion, which will result in siltation of nearby watercourses. Also impacts on water quality may be caused by contaminated runoff of petroleum product spillages, leakages from storage areas and heavy equipment, improper disposal of used oils and from hydraulic fluids which may enter the nearby surface water courses.

## 7.7 Soil Contamination

Dust from hauling trucks while transporting laterite, stone aggregate and petroleum products may change the soil structure. This impact is considered insignificant. Soil contamination may result from poor handling of petroleum products such as oil and diesel during dispensing as well as improper disposal of waste oils, hydraulic fluids, and empty oil containers. This phase involves site stock piles preparation, construction of detours, access roads and drainage excavations which will cause soil destabilization and Soil compaction by plant machinery and vehicles movement.

## 7.8 Road Traffic on Pedestrians

During construction phase, use of the existing road is likely to be affected as some areas will be blocked off to allow for road works. This may lead to use of improvised detours by road traffic and this may compromise safety of pedestrians in adjacent areas if not well planned.

## 7.9 Waste Generation and Management

On some sections of the road, temporary camp sites will be erected and will require sanitation facilities such as pit latrines. Construction of substandard pit latrines for campsite labour force may contaminate groundwater through seepage. Waste generated from the camp sites may be hazardous if not properly managed.

## 7.10 Involuntary Resettlement

Some residents along a few of the selected roads will be displaced from their current area and this has been addressed in the Abbreviated Resettlement Action Plan (ARAP).

## 7.11 Incident/Public Safety

The borrow pit and related activities (equipment movement by trucks and front-end loaders) are dangerous to workers and the local public.

## 7.13 Risk of Fire

Lubricants if not properly handled may result in fire.

## 7.13 Ecological Resources

Minimal ecological resources will be affected by vegetation clearing.

## 7.14 Loss of Livelihood

A few households affected by Involuntary Resettlement will lose their source of economic livelihood and these have been addressed by the ARAP.

## 7.15 Loss of Fruit trees

The road rehabilitation will result in insignificant loss of planted and mature fruits trees situated along the proposed project route.

## 8.0 Positive Impacts

i. Increased access to the markets, jobs, education and health services and reduced passenger transport costs.
ii. Improved transport connectivity system (road network) in the districts and the province in general.
iii. Improved livelihoods of the local people settled near to the roads thereby reducing travel times.
iv. The resettlement process will result into people building modern structures that will improve the image of the project area.
v. Creation of Employment opportunity during the project cycle.
vi. Increased trade opportunities in the community due to increased population during the project cycle.
vii. Increase in revenue to local authorities and institutions from communications, land rates, licenses and personal levy.

## 9.0 Environmental Management Plan

**9.1 Soil Erosion and River Siltation:** To prevent soil erosion and river siltation of water course due to soil erosion of nearby drains and culverts; the sides of the drainage shall be planted with grass or stone pitched and silt traps shall be put along drainage systems and the spoon drains shall have scour checks.

**9.2 Disturbance of Flora and Fauna:** Vegetation clearing shall be restricted to the project area. Unnecessary cutting of trees will be discouraged.

**9.3 Air Pollution:** Dust will be suppressed by spraying the road with water along dust roads; Haulage trucks shall not exceed the speed limit of 40 km per hour; Construction vehicles and equipment shall be subjected to regular maintenance in order to reduce emission of exhaust fumes and in case of excess dust workers will be provided with Personal Protection Equipment (dust masks).

**9.4 Noise:** To prevent noise pollution workers will be provided with appropriate earplugs and other appropriate Personal Protective Equipment (PPE). It will also be ensured that noise levels throughout the project cycle will be maintained within acceptable levels. The project machinery will be serviced regularly and kept in good working condition. The working hours shall be restricted to the normal working hours no works to be done after 18:00 hours.

**9.5 Water Pollution and Soil Contamination:** To prevent contamination of soil and water resources. Petroleum products storage point will have bund walls to contain spills constructed to the capacity of 110% of the holding tank; Storage of petroleum pollutants such as fuel and oil will be done on impermeable surfaces to prevent soil contamination; any fuel/oil spills will be contained to prevent it from entering into the aquatic environment.

**9.6 Road Traffic on Pedestrians:** Sufficient road sign posters shall be installed along the road. The speed limit signs and /or humps for project vehicles to be provided at human settlements and around the project area. Speed humps to help reduce the speed of trucks on the access roads will be built. It will be ensured that a buffer zone of 40 metres is created for each borrow pit. Borrow pits shall not be done near the residential areas; water surface; heritage sites and all sites used as material source should be rehabilitated by back filling and vegetation cover. Dangers warning signs shall be erected at borrow pits.

**9.7 Waste Generation and Management:** To prevent accumulation of waste on site. Waste segregation and minimisation of waste generation shall be encouraged. Waste bins will be provided for various waste streams on site. The waste will be disposed off in line with waste management regulations. Waste generated during the extraction process shall not be left in stockpiles at sites. Such waste and other excess material shall be used for rehabilitating borrow pits and landscaping around the sites.

**9.8 Involuntary Resettlement and Loss of Livelihood:** Construction shall be confined to the road reserve area but some community along the project area to be affected will be compensated according to the ARAP.

**9.9 Risk of Fire:** Fire fighting equipments are to be placed at strategic points. Training of project workers in First Aid and basic fire fighting techniques.

**9.10 HIV/Aids:** conduct a comprehensive health awareness campaign among the local community and project workers on the dangers of HIV/AIDS pandemic in consultation with the local health centres. Provision of condoms to all project workers at all times. Construction workers shall be recruited from local people to reduce on cross infection from outside areas.

## 10.0 MEASURES TO MITIGATE ADVERSE IMPACTS AND ENHANCE POTENTIAL BENEFICIAL IMPACTS

The following measures are recommended to mitigate the impacts identified.

### Table 2.0 Mitigations Measures

| | What is the Negative Impact? | Why does it need to be managed? | How should it be managed? | Phase / What is the Frequency? |
|---|---|---|---|---|
| 1 | Soil Erosion and River Siltation: | To prevent Soil Erosion and River Siltation. | ▪ The sides of the drainage shall be planted with grass or stone pitched and silt traps shall be put along drainage systems and the spoon drains shall have scour checks.<br>▪ Borrow pits shall be located away from existing settlements and water sources. | Construction and Operational. Phases. |
| 2 | Disturbance of Flora and Fauna | To prevent Disturbance of Flora and Fauna | ○ Vegetation clearing shall be restricted to the project area. Unnecessary cutting of trees will be discouraged.<br>▪ | Construction Phase |
| 3 | Air Pollution | To prevent Air Pollution | ▪ Dust will be suppressed by spraying the road with water along dust roads; Haulage trucks shall not exceed the speed limit of 40 km per hour; Construction vehicles and equipment shall be subjected to regular maintenance in order to reduce emission of exhaust fumes and in case of excess dust workers will be provided with Personal Protection Equipment (dust masks). | Construction Phase |

| | | | | |
|---|---|---|---|---|
| 4 | Water Pollution and Soil Contamination | To prevent Water Pollution | ▪ Petroleum products storage point will have bund walls to contain spills constructed to the capacity of 110% of the holding tank; Storage of petroleum pollutants such as fuel and oil will be done on impermeable surfaces to prevent soil contamination; any fuel/oil spills will be contained to prevent it entering into the aquatic environment. | Construction and Operational Phases |
| 5 | Road Traffic Accidents. | To prevent Road Traffic Accidents | ▪ Sufficient road sign posters shall be installed along the road. The speed limit signs and /or humps for project vehicles to be provided at human settlements and around the project area. Speed humps to help reduce the speed of trucks on the access roads will be built. It will be ensured that a buffer zone of 30 metres is created for each borrow pit. Borrow pits shall not be done near the residential areas; water surface; heritage sites and all sites used as material source should be rehabilitated by back filling and vegetation cover. Dangers warning signs shall be erected at borrow pits. | Construction Phase |
| 6 | Waste Generation and Management | To prevent accumulation of waste on site | ▪ Waste segregation and minimisation of waste generation shall be encouraged. Waste bins will be provided for various waste streams on site. The waste will be disposed off in line with waste management regulations. Waste generated during the extraction process shall not be left in stockpiles at sites. Such waste and other excess material shall be used for rehabilitating borrow pits and landscaping around the sites. | Construction Phase |
| 7 | Involuntary Resettlement and Loss of Livelihood | Compensation | ▪ Construction shall be confined to the road reserve area but some community along the project area to be affected will be | Construction Phase |

| | | | | |
|---|---|---|---|---|
| | | | compensated (if any personal effects are affected). | |
| 8 | Noise quality | To prevent noise pollution | ▪ Workers will be provided with appropriate earplugs and other appropriate Personal Protective Equipment (PPE).<br>▪ The developer will ensure that noise levels throughout the project cycle will be maintained within acceptable levels.<br>▪ The project machinery will be serviced regularly and kept in good working condition.<br>▪ The working hours shall be restricted to the normal working hours no works to be done after 18:00 hours. | Construction Phase |
| 9 | Occupational, Safety, Health and Environment | To prevent incidences of accidents. | ▪ All personnel will be trained and provided with appropriate Personal Protective Equipment (PPE). | Construction Phase |
| 10 | Fire Risk | To prevent Risk of Fire | ▪ Fire fighting equipments are placed at strategic points.<br>▪ Training of project workers on First Aid and basic fire fighting techniques. | Construction Phase |
| 11 | HIV/AIDS | To prevent spread of HIV/AIDS | ▪ In consultation with the local health centre and HIV/AIDS Clubs in particular, conduct a comprehensive health awareness campaign among the local community and project workers on the dangers of HIV/AIDS pandemic.<br>▪ Screening of project workers for STIs.<br>▪ Provision of treatment to project workers and their partners regarding non-HIV/AIDS cases and refer HIV/AIDS cases to National AIDS Program for treatment under the Ministry of Health.<br>▪ Provision of condoms to all project workers at all times.<br>Construction workers shall be recruited from local people to | Construction Phase |

| | | | | |
|---|---|---|---|---|
| | | | reduce on cross infection from outside areas. | |
| 12 | Bio diversification | To prevent impact on bio diversification | ▪ Discourage construction workers from engaging in the exploration of natural resources such as hunting, fishing, and collection of forest products or any other activity that might have adverse impact on the social and economic welfare of the local communities. | Construction Phase |

## 11.0 Conclusion

The identified negatives impacts have mitigation measures and the project benefits far outweigh the project negative impacts. The project will undoubtedly bring economic development in Eastern Province and Zambia as a whole.

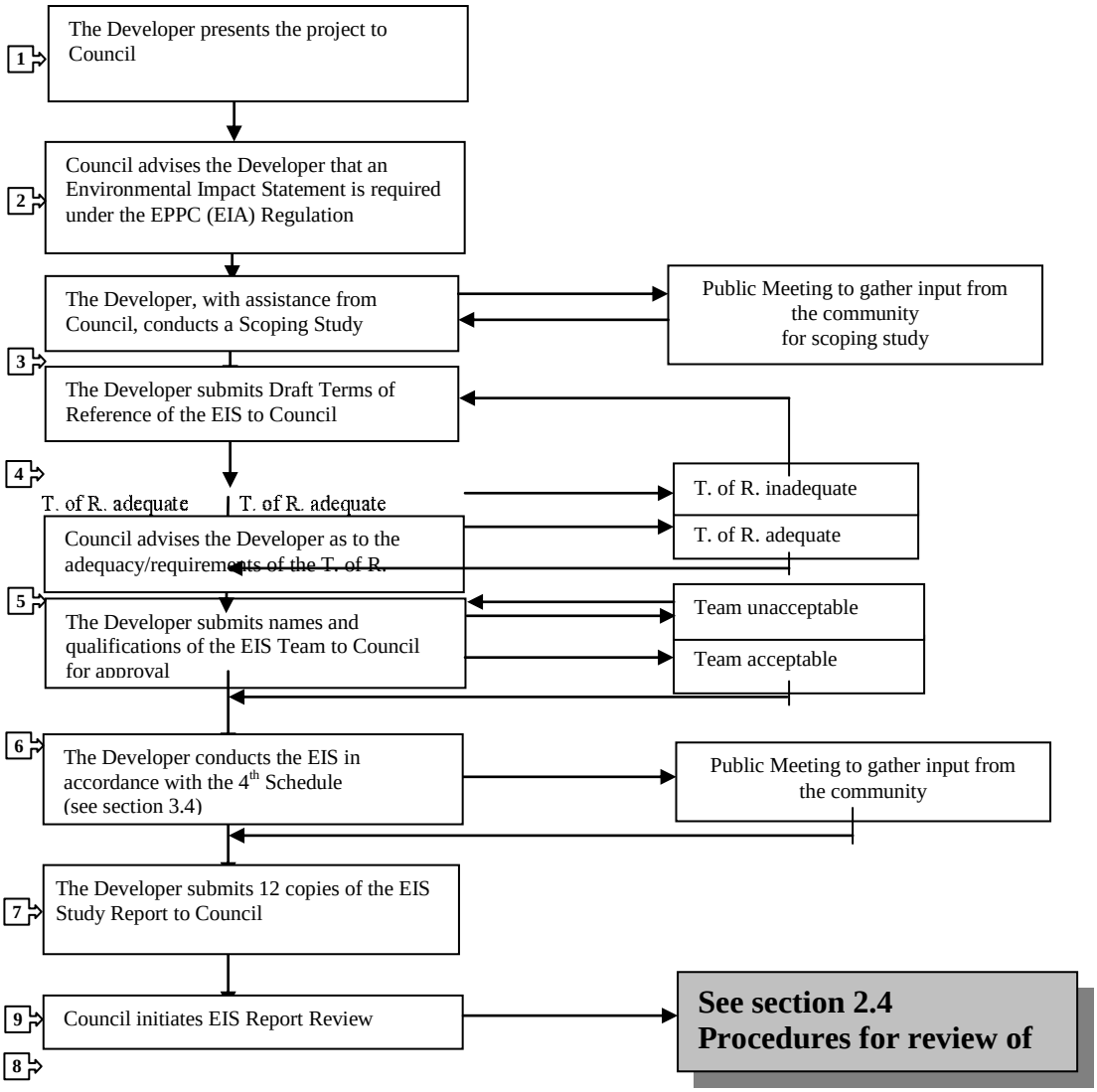
The project has other benefits of promoting road network which is also being supported by the Government as a strategy towards poverty alleviation.

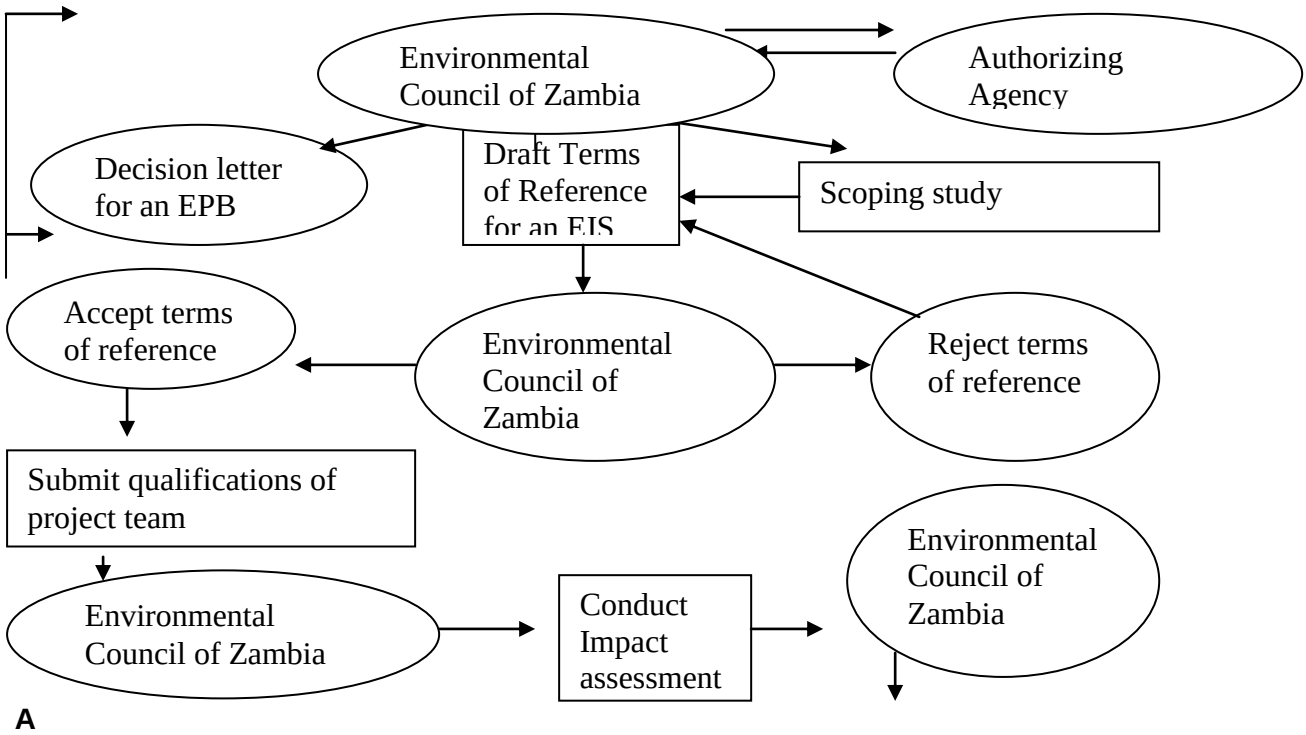
The company will ensure that the Environmental Management Plan (EMP) is well implemented and stringent measures and procedures are followed in managing negative impacts.

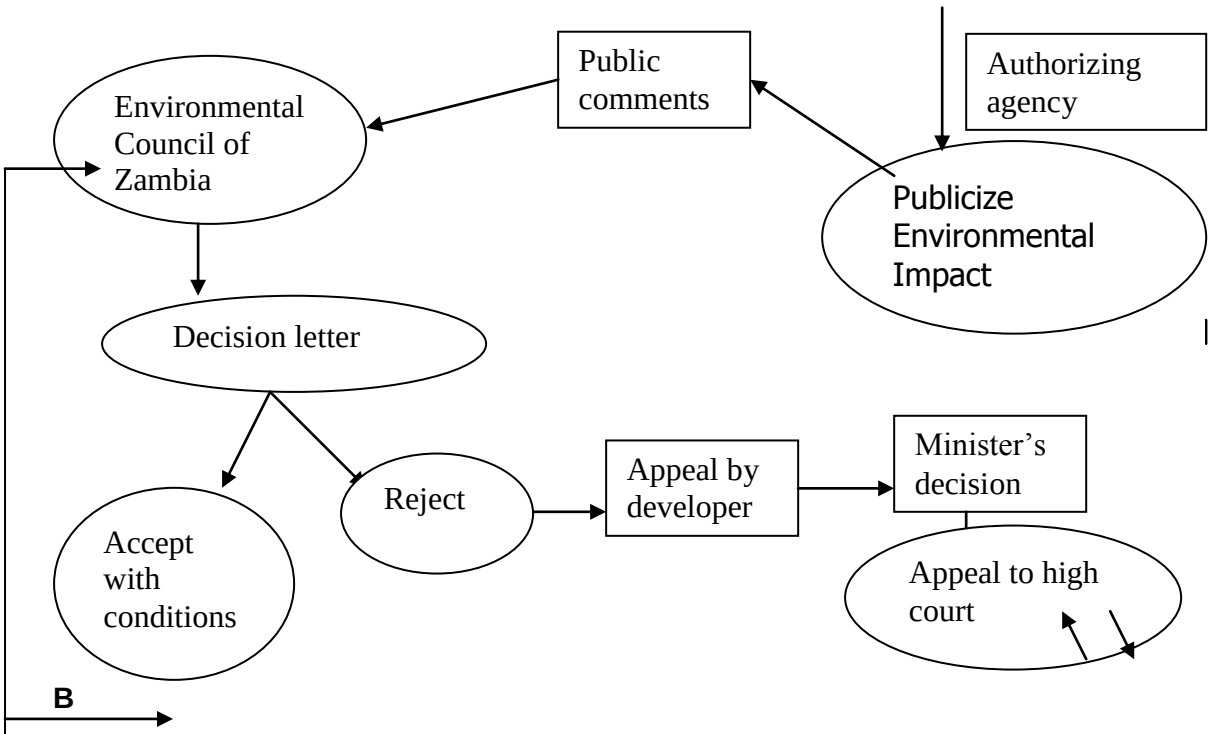
Huachang Infrastructure Engineering (Z) Limited upholds the need to comply with national and international laws and regulations, standards and codes of practice relevant to this project.

## ANNEX 2

## FLOW CHART OF THE EIA PROCEDURE IN ZAMBIA






A: decision cycle for an Environmental Project Brief (EPB) which takes 40 working days
B: Decision cycle for an Environmental Impact Statement (EIS). This takes 65 working days.