TWIN PALM SHOPPING MALL LTD

ENVIRONMENTAL PROJECT BRIEF

For the proposed

EXPANSION OF TWIN PALM SHOPPING MALL PROJECT

AT SALAMA PARK, AVONDALE, LUSAKA

PREPARED BY MVC CONSULTING ENGINEERS

FEBRUARY 2017

DECLARATION

Twin Palm Shopping Mall Ltd declares that the information presented in this EPB is true and authentic.

Signed:

Designation:

Name:

EXECUTIVE SUMMARY

Twin palm Shopping mall Limited is a Zambian registered Company owned by Twin Palm Shopping Mall of Mauritius and FNC Corporate services of Zambia. The Company, which was registered in 2012, has invested over 15Million United State dollars in developing an ultra-modem shopping mall in Salama Park. The mall has been fully operational since 2014 and houses big names such as Shoprite, Pep stores, Jets, Hungry Lion, Zamtel etc.

Although the mall has been in operation since 2014, there has been a growing demand for rental space and this has caused the board of directors to now consider expansion of the existing structures, as phase 2 of the project. The proposed development introduces an iconic retail-centric mixed-use development with an international flavor (just like phase 1), where people will experience an exclusive shopping environment, dine and socialize in an up market setting. The building to be constructed will have a number of retail outlets of different sizes. The foot print for the entire project is **8,500** m^2, where **1,800 m^2** is for the extension of the car park area and **6,700 m^2** is the floor area of the building extension. So it's against this background that this report is being compiled. It is for this reason that the company commissioned the compilation of the Environmental Project Brief to fulfil the requirements of the Environmental Impact Assessment (EIA) Regulations. It should be noted that phase 1 was catered for in the EIA that was compiled in 2007.

The main objective of Twin Palm Shopping Mall's proposed project is to expand its modern structure that would then be partitioned into various shops of different sizes. In conducting the expansion of the structure to house the retail outlets, trucks, dozers, picks and also shovels will be used. The project will cost about USD$5.5 Million. About 200 people will be employed once the project is completed and all the shops are fully operational.

The nature of this project is of low level owing to the fact that areas where the new infrastructure will be built has already been cleared of vegetation and hence will only result in very minimal environmental impacts within the project area. The project has been designed in such a way that it utilises the space already cleared of vegetation. Twin Palm Shopping Mall Ltd will put a great emphasis on environmental management by ensuring that the work area is devoid of dust arising from the construction activities. Twin Palm will also endeavour to work closely with the Zambia Environmental Management Agency (ZEMA), the Ministry of Commerce and Industry and the Lusaka City Council in conducting their works, so that nothing will be done outside what they have agreed to do.

The building being constructed is a single storey in structural steel enclosed by plastered and painted concrete block work walls on concrete surface bed. The foundation are a

combination of concrete pads to support the steel structure and strip footing with concrete block work walls to support the superstructure concrete block work walls . The roof covering will be IBR sheets on steel trusses with sisalation insulation underneath. Shop front fixed light window openings in aluminium frames and safety glass. It is anticipated that the building will have a lifespan of more than 40 years.

Location

The Project is located at the same Twin Palm Shopping Mall, just in front of the existing structure as indicated in figure 1.

Legislation

The Environmental Impact Assessment Regulations, SI 28 of 1997

The Environmental Impact Assessment (EIA) Regulations, Statutory Instrument (SI) 28 of 1997 demands that before a developer commences implementing a project, an environmental project brief (EPB) be prepared and submitted to the relevant regulatory authority for review and approval. Thus, this EPB has been compiled in compliance to above requirement. The following are other regulations relevant to the Project and are described in section 3 of the report. These includes:

- Air and Water Pollution: Part II (Regulations 3-9) of SI 112 (2013)
- Waste Management: Part III (Regulations 10-17) of SI 112 (2013)Statutory Instrument No. 112 of 2013 – Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations;
- Statutory Instrument No. 112 of 2013 – Water Pollution Control (Effluent and Wastewater) Regulations;
- Local Government Act No. 13 of 2010;
- National Council for Construction Act No. 13 of 2003;
- The Urban and Regional Planning Act No. 3 of 2015.

Impacts and Mitigations

A summary of the main positive environmental and socio-economic impacts of the project include:

- Employment and training of local people as casual workers on daily rate basis in accordance with the Labour Laws of Zambia.
- Increased space for the people to rent and conduct business in a conducive environment;
- Reduced prices for rental as this will also be part of the main structures that have been built in the city.

A summary of the main negative environmental and socio-economic impacts for the project include:

- Noise pollution especially during the construction period that will arise and will most likely disturb the neighbours and those using the facilities at the mall as the expansion works continue. Noise especially when the equipment has not been serviced.
- Construction activities, if not conducted properly can lead to problem of dust especially to people walking nearby and also neighbouring shops
- Compromise the safety of the people walking close to the shops, especially construction activities and off cuts of the construction activities that will be generated in the process of making the shops;
- From a socio-cultural perspective, the project will attract people from the surrounding areas and beyond seeking employment during the construction and also wanting jobs during operations of the shops. This will lead to overcrowding, thus resulting to people taking advantage to steal from others.
- If not completed in time, it can also lead to the people using the building for illicit activities during the night
- Possible HIV / AIDS and other sexually transmitted diseases transfer especially when people that are constructing the structure come from outside town and leave their families.

Environmental Management Plans to manage these and other less significant impacts have been developed and are described in this report. The approach is based on Environmental Regulations and industry best practice. Twin Palm Shopping Mall will implement an Environmental Monitoring Plan that will focus on noise, dust and also waste management coming from the project site. The plan will monitor environmental performance and compliance with Zambian Environmental Regulations and other relevant guidelines/limits. The environmental management actions to be adopted include:

- Servicing of the construction equipment to ensure that they operate properly without causing a lot of noise;
- Spraying the working areas with water so that dust can be suppressed;
- Enclosing and covering the working areas so as to ensure that the people do not have access to the working area;
- Ensuring that the site is guarded, especially at night to avoid any illicit activities from being conducted on site;
- Providing sensitisation programmes especially to the workers on the dangers of HIV/AIDs. The company will also provide condoms to the workers as a way of minimising infection if the people cannot abstain.

Twin Palm will implement internationally accepted occupational health and safety standards and procedures throughout its operations to create a safe workplace

(especially during construction) thereby protecting the workers and people from accidents and sickness. The Company will also implement education programmes and support to stop the spread of malaria and HIV/AIDS.

Project Alternatives

Six alternatives were considered for this project which included No project option, alternative project site, source of energy, water provision, waste management and type of construction.

The No project option, as the analysis showed, would also have both positive and negative impacts i.e. positive in the sense that by not implementing the project, then all the negative impacts that would arise from the project would not be generated and also negative in the sense that the positive impacts that would arise as a result of the project implementation would also not occur. Thus weighing this option, the negatives of not implementing the project far outweighs those of the positive.

For the alternative site option, it would mean acquiring land from the council on which to establish the project. This would mean applying for land, and then fulfilling all the procedures required especially during land allocation require a lot of time. The other issue about this alternative is that impacts that might occur as a result of this option might be more because land might be found in areas with a number of vegetation which would need to be cleared in order to construct the structure. This option would also generate a lot of environmental impacts as vegetation would be required to be cleared before construction. Thus looking at the activities that would require to be done, it thus becomes easy to use the available place, for the project. As such, this option of another site was not considered.

On **electricity**, two options were considered. One option was to connect to the Zesco transformer as is the case with the phase 1 facility while the second option was to utilise the solar panels or Gensets as a source of electricity. It should be noted that the Zesco option was adopted owing to the fact that it is reliable and faster to connect except for the load shedding which is rampant in the area. Gensets then could be used as backup.

For the **waste management**, two options were considered. One option was where each client manages their own waste and the second option was where the company managing the facility also manages the waste as is the case with the shops currently operating onsite. Second option was considered owing to the fact that allowing all clients managing their own waste would not work well because this can lead up to congestion especially if the waste transporters were to come at the same time.

For the **water**, the current option is where the Lusaka Water & Sewerage Company connects the facility to the water main line and then provide a meter to each client for monitoring of usage. This option has been effective and the company would prefer this option. The other option is drilling a borehole and providing the water to the facility

from the borehole. This option was not considered owing to the fact that it would increase the cost and also activities for the company managing the mall Onbehalf of Twin Palm.

On the **type of construction**, three options were considered i.e. pre-fabricated panels, concrete panels and standard concrete one. Following the analysis, the rating was as follows:

i. Standard Concrete one – this was chosen on the basis of flexibility especially during the Closure phase of the project. The structure can easily be transformed into some other alternative use at minimal cost. The other reason was that the structure is able to stay for more than 40 years.

ii. Concrete panels – this option was also chosen but could not be adopted owing to the fact that despite being durable, the structure constructed using this type of design would actually be difficult to transform into something else. This then would restrict the usage of the building especially at closure. Cost for such structures is also high.

iii. Pre-fabricated structures – this option was good in terms cost but not adopted because it can be difficult to transform it into anything. The structure does not stand for a long time. The maximum period it can stay is about 20 years.

Conclusions

The impacts of highest significance that will affect the environment, as highlighted in the document, are those related to noise, dust and safety (from construction activities as well as from construction vehicle movements). This however, will not cause significance problem in the sense that the construction will be taking place in an area that will be fenced off and baricated. For the off cuts especially steel ones, people involved in fabrications especially those that make braziers and other kitchen utensils have already approached the company, so that they can be considered. In terms of the natural environment, nothing will be affected as a result of the project as it's already a built up area.

The other benefits of the project, as highlighted in the report, are those related to social – economic nature. Thus the project, once implemented, will help significantly to develop the City.

Table of Contents

ABREVIATIONS AND ACRONYMS

ECZ	Environmental Council of Zambia
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPB	Environmental Project Brief
EPPCA	Environmental Protection and Pollution Control Act
IT	Information Technology
LCC	Lusaka City Council
LWSC	Lusaka Water & Sewerage Company
MOH	Ministry of Health
NAPSA	National Pensions Scheme Authority
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NISIR	National Institute for Scientific and Industrial Research
PAYE	Pay As You Earn
PPE	Personal Protective Equipment
TPSML	Twin Palm Shopping Mall Ltd
VAT	Value Added Tax
ZABS	Zambia Bureau of Standards
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambia Electricity Supply Corporation
ZRA	Zambia Revenue Authority

1.0 DETAILS ABOUT DEVELOPER

Name of Developer
Twin Palm Shopping Mall Ltd

Address of Developer
Postnet Box 371, P/Bag E891, Manda Hill
Lusaka, Zambia

Physical Address of Developer
Plot No. 862, Salama Park,
Avondale, LUSAKA

Contact Person

Name	:	Mr. Stewart Ndhlovu
Position	:	Project Manager
Cell Number	:	0977640755
Email Address	:	mkhimbo@gmail.com

Table 1.1 Details of Shareholding

SHAREHOLDER	NATIONALITY	ADDRESS	No. of SHARES	% of SHARES
TWIN PALM SHOPPING MALL LTD	MAURITIUS	11th FLOOR, TOWER 1 NEX TERACOM BUILDING, EBENE CYBERCITY, MAURITIUS	4,950,000	99
FNC CORPORATE SERVICES LTD	ZAMBIAN	VILLA 15, MILLENIUM VILLAGE, BIRDCAGE WALK, LONGACRES, LUSAKA	50,000	1

Table 1.2 Details of Directors

NAME	NATIONALITY	IDENTIFICATION	ADDRESS
John David Glendinning	Zimbabwean	BN 310515	House No. 26, Sable Road, Kabulonga, Lusaka Plot No. 6310 Avondale, Post Net 371 Manda Hill, LSK
Stewart Ndhlovu	Zambian (NRC No.	208392/16/1	Plot No. 6310, AVONDALE, Lusaka Post Net Box 371 Manda Hill, LUSAKA
Adam Deryck Glendinning	Zimbabwean	BN 556425	Plot No. 6310 Avondale, Post Net 371 Manda Hill, LSK
Lubinda Linyama	Zambian (NRC. NO. 693770)	693770/11/1	Flat 17, Suez Rd, Longacres, Post Net 571 Manda Hill, LSK
Donald Garry Youngman	Zimbabwean	BN 403958	No. 23rd AVENEW BELMONT, BULAWAYO, ZIMBABWE

2.0 INTRODUCTION

Twin Palm Shopping Mall Limited is a Zambian registered private company, which was registered on the 21st August 2012. The company intends to construct a structure, on the stand that used to be Barclays Bank, which will then be partitioned into retail shops of various sizes. These Retail shops will be rented out to various customers once complete.

Twin Palm Shopping Mall Limited shareholders have a diversified portfolio throughout Southern Africa which includes offices, warehouses and shopping centers. In this regard, they bought the piece of land on which was the former Agriflora farm. The proposed development introduces an iconic retail-centric mixed-use development with an international flavor (just like phase 1), where people will experience an exclusive shopping environment, dine and socialize in an up market setting. The building constructed will have a number of retail outlets of different sizes. The foot print for the entire project is **8,500** m^2, where **1,800 m^2** is for the extension of the car park area and **6,700 m^2** is the floor area of the building extension. So it's against this background that this report is being compiled.

Thus, against this background, Twin Palm Zambia commissioned the compilation of the Environmental Project Brief (EPB) for this project. This way, the company will ensure that it meets all the regulatory requirements.

The principal purpose of this report is to describe the project that the company intends to implement. This Project Brief will also address the environmental effects created by this development and will propose the related mitigation measures. This has been done in compliance to the requirements and guidelines provided by Zambia Environmental Management Agency, as stipulated by the Environmental Management Act of 2011 read together with (Environmental Impact Assessment) Regulations, 1997.

2.1 Project Background

Lusaka is experiencing a very special time of growth and expansion. Apart from the mining industry (Cement mining), the retail industry in Lusaka is also recording good growth. A good number of cement mines have been opened in Lusaka recently. This never-seen volume of retail traffic is fueling Lusaka's economic growth and expansion. Another economic growth indicator is the growing demand for accommodation services. Property values and rents have gone up tremendously over the last three years. The construction industry is also experiencing a boom.

These trends reveal that poverty levels are declining in the province. The latest survey of living conditions shows that 58% of the households in Lusaka province were considered non-poor. This means that the size of middle class income category is growing and more households have money to spend. It follows, therefore, those residents of the province desire to have shopping facilities where they can spend their kwacha.

The appetite for shopping space in downtown Lusaka is huge. This is reflected not only in terms of occupancy but the rentals are soaring. Shops are remodeling their interior and window displays. Indeed the increase in investment in commercial buildings is testimony

to the appetite for space.

Expansion in retail establishments has not matched the growth in demand for services. Shopping in Lusaka's CBD is a time wasteful experience because of general congestion. This Lusaka Main CBD is congested and is becoming unbearable. Customers are waiting more than 30 minutes in the queue to pay for their goods especially during the month-ends. Shopping in Shoprite supermarket in Town is no longer an enjoyable experience during most hours. Lusaka is also having pressure on other public services apart from the road network and shopping space in the downtown area.

These developments of shopping malls represent the genesis of a regional movement from basic old fashioned retail operating in downtown and around market places such as Soweto towards modern high-street-style of retailing. Shopping malls will become the norm soon. In addition, Lusaka city needs a new look. The city has maintained the same old look for the last 50 years. The existing infrastructure in Lusaka CBD was designed and built for a small mining town. Not only is the infrastructure congested, it is primitive and old fashioned.

In general it can be said that the provision of modern infrastructure in the city has not matched recent developments in the economy and population growth. As a result, the city faces a number of problems including inadequate space for commercial outlets. There is an urgent need to address these inadequacies in Lusaka and to meet a growing demand for modern facilities in the office and retail market.

Thus it's against this background that Twin Palm Shopping Mall has decided to expand the shopping mall facility with aim of providing more space for retail business outlets to help decongest the already congested retail facilities. The facility will be able to accommodate a number of outlets thus enabling the people to buy their products without waiting in the queues for too long.

2.2 Project Location

The project is located at Salama's Park Twin Palm Shopping Mall, just in front of the existing facility for phase 1. As mentioned in the Executive Summary, the project is being established at a built up area, as such, no disturbance to the natural environment is envisaged as there are no trees on site. The site is centered on Coordinates 15°23'19.42" 28°23'34.46" E.

2.3 Capital Cost

It should be noted that in establishing this project, Twin Palm Shopping Mall has secured about **USD$5.5 million** to help with the construction of the project.

2.4 Project Implementation

In terms of the implementation, this will happen immediately all the approvals are obtained. This is envisaged to be around March 2017.

2.4 Previous Experience

Twin Palm Shopping Mall is a Zambian Company, which was registered in 2012. The company has been operating for the past 3 years after construction of the Mall at Salama

Park. The mall houses big names such as Shoprite, Pep stores, Jets, Hungry Lion, Zamtel, Debonair just to mention a few.

Twin Palm Shopping Mall Ltd belongs to a group of companies including PMTP Zambia Limited (Civil Contracting), DJR Investments Limited (Property/Farming) and Avondale properties (Hospitality). The Group has more than 10 years of experience in the same business.

Though operating for three years, the Directors and shareholders have extensive experience in Estates and Property Development. Among the projects where the Directors/Shareholders are involved include the development of housing and Twin Palm Mall at Salama Park, the development of Office Park in Kabulonga, the development and operations of the Lodge in the Lower Zambezi among others.

The proposed development, which is subject of the extension of Twin Palm Mall, will introduce an iconic retail-centric mixed-use development with an international flavour, where people will experience an exclusive shopping environment, dine and socialize in an up market setting.

2.5 Scope of study

The Environmental Project Brief study follows the requirements as enshrined in the Environmental Impact Assessment regulations of the Environmental Management Act of 2011. The study addresses positive as well as negative impacts and recommends measures for adequately managing negative environmental effects as a result of implementing the project.

2.6 Objective

The primary objective of preparing this Environmental Project Brief (EPB) is to examine, in a logical manner, the impacts of the construction and operation of the Retail Development Project on physical, biological, socio-economics, socio-cultural environment and to provide adequate mitigation measures for the potential impacts.

2.7 Methodology

The study was undertaken to obtain the views and concerns of the interested and affected parties. The following steps were involved in the process:

- Review of relevant legislation;
- Review of environmental literature;
- Identification of significant environmental aspects and development of mitigating measures; and
- Development of an environmental management and monitoring plan.

3.0 LEGISLATIVE REQUIREMENTS

3.1 Environmental Management Act of 2011

The Act provides specific regulations for discharge, collection, storage, transportation and disposal of gaseous, liquid and solid waste. This Act was passed in the year 2011 and it is the Principal Act governing and regulating environmental issues in Zambia. Its main functions include the protection of the environment and control of pollution. In particular, it provides for the health and welfare of people, animals, plants and the environment. Below are the Statutory Instruments which complement the Environmental Management Act of 2011. The attendant Environmental Impact Regulation of 1997 (statutory instrument No. 28 of 1997) requires that an Environmental Project Brief is prepared for the establishment of the project like this. The act is relevant to the project due to the fact that the project will involve manufacturing of roofing sheets and waste products in the form of off cuts will be produced and also noise. Mitigation measures for possible environmental impacts as a result of the project are described in the project's Environmental Management Plan.

The Act also provides regulations for discharge, collection, storage, transportation and disposal of gaseous, liquid and solid waste.

Below are the subsidiary SIs of the EMA that are relevant to Twin Palm Shopping Mall Ltd (TPSML) project:

- Statutory Instrument No. 112 of 2013 – 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. The Project will generate non-hazardous solid waste during construction and operation. The waste generated will require to be transported and disposed off at designated and licensed waste disposal site. A license will be required for transportation and disposal of waste.
  Compliance: Twin Palm Zambia will arrange for a registered waste transporter to collect the waste at the premises.

- Statutory Instrument No. 112 of 2013 – 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. Twin Palm Zambia will make arrangements through Lusaka Water and Sewerage Company to connect their facility with their services and pay for the services rendered.

- 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. The regulation require project developers undertaking projects that may have an effect on the environment to conduct environmental and social impact assessment prior to obtaining written approval of the Project from ZEMA. The Project falls within the Second Schedule of the EIA regulations and as such requires an EPB. This EPB for the Project has been prepared following the provisions of the EIA regulations.

3.2 National Council for Construction Act No. 13 of 2003

The Act provides for the establishment of the National Council for Construction with the responsibility of providing for the promotion, development, training and regulation of the construction industry in Zambia. Under the Act, the NCC is further charged with the responsibility of registering of contractors, affiliation of professional bodies or organizations whose members are engaged in activities related to the construction industry and to provide for matters connected with or incidental to the foregoing.

Relevance: Twin Palm Shopping Mall, in engaging the contractors, will have to ensure that the companies are registered with the NCC and their licenses are upto date.

Compliance: Twin Palm Shopping Mall will make sure that all activities for construction fulfil the requirements of the NCC.

3.3 Public Health Act Ch 295

The Public Health Act empowers a Council to control diseases and pollution which are dangerous to human health and to any domestic water supply.

Relevance: The project should put in place measures to control the spread of diseases and to provide a clean environment necessary for human habitation.

Compliance: Twin Palm will ensure that all the applications that needs to be done are presented to the Council.

3.4 Labour and Social Security

There are various legislations that have been enacted to protect the workers in Zambia. Some of these laws are:

3.4.1 The Employment Act (CAP. 268):

Establishes guidelines on employment of an employee in Zambia.

3.4.2 Minimum Wages and Conditions of Employment Act (CAP. 276) (Statutory Instruments (SI) No. 2 & 3):

Establishes minimum guidelines for remuneration of an employee in Zambia. Relevance: Twin Palm Zambia will ensure that people are paid according to the labour laws of the country.

3.4.3 Industrial and Labour Relations Act (CAP. 269):

Establishes guidelines on employee and employer organisations and on the process of collective bargaining and dispute resolution.

Compliance: Twin Palm Zambia will ensure that in case of disputes, all the laws are followed in order to have an amicable solution to disputes at work.

3.5 The Urban and Regional Planning Act No. of 2015

This piece of legislation 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.

RELEVANCE: The regulation is relevant in that the Developer will need Planning approvals for the project especially building plans.

COMPLIANCE: Obtaining all the planning approvals from relevant authorities. Note that the area is already designated as commercial area. As such, the status of the site will be upheld but the project owners will obtain approvals for the building plans.

3.6 The Local Government Act No 13 of 2015

The Act provides for the establishment of Councils in districts, the functions of local authorities and the local government system. Some of these functions relate to pollution control and protection of the environment in general.

RELEVANCE: The regulation is relevant in that the Developer will need Local Authority approvals for the project as the Council will monitor the environmental performance of the project.

COMPLIANCE: All permits from the Local Authority will be obtained to prevent contravening the requirements of this regulation.

3.7 The Investment Act, 1993

The Act provides a legal framework for investment in Zambia. The Act relates to environment indirectly. The Act further recognizes the role of sectoral agencies including those responsible for environmental protection in authoring specific projects. The act, in promoting investments by investors (both local and foreign) provides incentives for establishment of developmental projects.

RELEVANCE: The regulation is relevant in that the development is an investment and as such, the regulation is applicable.

Compliance: Twin Palm Shopping Mall will ensure that it obtains an Investment Certificate.

3.8 INTERNATIONAL CONVENTIONS

Zambia is a signatory to a number of international conventions. Conventions of significance to the proposed project are briefly described below.

1) **Kyoto Protocol to the United Nations Framework Convention on Climate Change: -** The aim is to further reduce greenhouse gases by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries.

   Relevance to the Project: - Green house gases lead to climate change and there are worldwide campaigns especially for major investments to reduce emissions of green house gases. Some measures include carbon foot print calculation and to determine the contribution from a facility. The proposed project once implemented shall endeavour to contribute to these common efforts hence the relationship.

   Compliance: Twin Palm Shopping Mall will ensure that this convention is adhered to by ensuring that the green house gases are reduced all the time, by making sure that clients who rent shops do not use the refrigeration which would promote green house gas production.

2) **The United Nations Framework Convention on Climate Change (UNFCCC):-** It was signed by Zambia in 1992. The main objective is to achieve stabilization of greenhouse gas concentrations in the atmosphere. Zambia recognizes that the largest source of one of the main greenhouse gases, carbon dioxide, is from burning wood fuel and the use of coal and oil article 4 d.

   Relevance to the Project: - Just like the Kyoto Protocol, reduction of green house gases is key to this convention. Therefore, the proposed project shall ensure that best technologies are used (refrigeration) to reduce its emissions and impacts on climate change.

   Compliance: Twin Palm will ensure that best technologies (refrigeration) are used that does not promote generation of green house gases.

4.0 DESCRIPTION OF THE PROPOSED PROJECT

The objective of the project is to expand the shopping mall into a world class multi-use development. The project will aim to provide a new focal point for retail activities in Lusaka. It is expected that the development will maximize potential of the site's prime location with reference to Avondale and Ibex Hill. The project is designed to be a fully integrated project offering an internalized top end regional shopping mall.

The developer intends to maximize the multiplier effect on the Zambian economy. In addition to direct employment, it is expected that further employment will be stimulated by the project in other sectors related to construction and the provision of goods and services both during construction and operational phases. The developer is also Committed to ensuring that Zambian companies, local raw materials and finished products will be used as far as is possible for the successful completion and operation of the project.

The shopping complex will accommodate leisure, social and recreational facilities. These will include shopping, entertainment and administration area of **8,500m²**. This area includes the parking space. The area for the expansion of the car park is **1,800 m²** and that of the buildings is **6,700 m²** as shown in figure 4.1.

The mall will be inter-linked by covered walkways. The small retail-shopping units will vary in size from 48m² to **450m²**. However, the areas can be adaptable to the required minimums required by the tenant. This also allows for a wide range of tenant mix and wide range of commodity.

The expanded part of the mall will have adequate provision for full service restaurants and pubs in the complex and provisions for coffee shops and business café. The expansion project will still rely on Shoprite as the anchor shop for the whole facility.

The car parked or courtyard will be extended by 1,800 m², so as to carter for the envisaged increase in traffic due to the expansion project. The extended car park can also be used for meetings, performances, or open market space hence enhancing social interaction. The courtyard also breaks the monotony of built up space and provide leisurely atmosphere. Surface parking of approximately 300 vehicles plus 50 taxis near the road will cater for vehicles. This wide separation of parking will provide convenient flow of vehicles.

Project management during the construction phase will be undertaken by a project management company subcontracted by the developer. It is anticipated that over the construction period of the project, more than 1000 people will have been directly employed to ensure its implementation; the main contractor's labour force is expected to peak at 250 persons and where subcontractors are concerned, the labour force is estimated to peak at 750.

Once operational, it is expected that the project will create employment in the region of 600 new permanent job opportunities in Lusaka.

Management of the project during operation will be undertaken by a Property Management Company owned or subcontracted by the developer. In keeping with the principals of sound environmental management and sustainability of the project, all tenants will be required to adhere to Centre rules regarding the management of waste and maintenance of safety standards.

The project is made up of four phases namely preparation, construction, operation and decommissioning phase. Each of the phases comprises a series of activities contributing to overall attainment of the project objectives. The activities involved in each phase are elaborated in the sections below.

i. Pre -Construction (Design) Phase

This phase involves carrying out a survey of the proposed shopping mall. Survey in this case refers to land investigations, drilling, measurements and pre-works examination of the site. To facilitate the development of a conceptual design an environmental impact assessment was undertaken and the key concerns from the study were taken into account in the design phase. The output from this phase is an environmentally friendly-engineered design for the shopping mall, which has to be implemented in the construction phase.

ii. Construction Phase

The actual construction of the shopping mall will take place in the construction phase. The estimated shopping mall works will cover the following activities:

Shopping mall construction

The initial activities during this phase relating to construction management will include:

- Establishment of the construction Project Management Team (PMT).
- Establishment of a professional Site Inspection Team.
- Establish and agree management, inspection, and reporting procedure

The Site Establishment will include the initial construction of the following facilities:

- Establishment of site screening facilities to cover the area where the construction activities will be conducted. The screening facilities will also act as a safety precaution or measure;

- Arrangement of the materials and equipment to be used during the construction
- Erection of the signs and warnings around the site
- Notifying of the neighbours about the works to be conducted onsite

Construction activities will be repeated as required over the two phased Construction cycles. The main anticipated project construction activities that will have potential impacts on the environment are:

a) Site Preparation and Leveling

Initial site preparation will entail removal of the existing infrastructure, scarifying of initial concrete works from old buildings and earthworks to establish the required levels. The project will be constructed by-and large on the existing level requiring minimal basic earthworks, which will minimise the need for filling of areas with laterite and aggregates. Earthworks will for the most part involve the use of heavy machinery such as bulldozers and graders to basically remove old concrete materials from the site. It should be noted that this will be done in such a way that operations from the existing structures are not affected. To achieve this, barricades will be installed so that they shield the works of the extension works. For traffic, management will open up new entrances on the western side (neighbouring the Building Hub structures). The new entry and exit points will also enable traffic to join Simon Mwansa Kapwepwe road close to Lutheran Church.

b) Excavation and Foundations:
This will involve the excavation of trenches for foundation strips for buildings and trenches for ground water storage tank water, and sewage reticulation system. The geotechnical survey of the site is indicative that the bearing capacities of soils are good and the foundation depth and design for the intended structures will not be complicate.

This will be in accordance with local engineering standards. Construction of foundations will involve the compaction of underside of foundation trenches and Pouring and mixing of concrete

c) Sub-structural works and Floor slabs
This will involve block work, mixing, pouring and compaction of concrete, backfilling and compaction of material according to specifications. This sub structural works will include the laying of water and sewage reticulation pipes and underground electrical cables.

d) Construction of Superstructures (shopping mall)
This will involve:
The preparing of mortar and concrete.

- Structural steel erection
- The laying of concrete block walls.
- Fixing of roofs.
- Erection of roof trusses.
- Installation of finishes and fixing electrical and plumbing fixtures and fittings.
- Landscaping

e) Materials Mobilization, Handling and Storage

This refers to the acquisition, delivery, and storage of materials required for construction works. Gravel, laterite, and stone aggregates will be acquired and transported to the site from ZEMA approved quarry sites within the Lusaka area. Provision will be made for bulk storage of materials such as sand, aggregate and laterite. Petroleum products, such as fuels (petrol/diesel), lubricating oils, hydraulic fluids and bitumen / asphalt mix will also be sourced when required to be used. Only limited amounts of these materials will be stored on site as reliable supply sources will be within close proximity. No fuel will be stored on site. Other materials that will be transported and stored include sand, cement, paint and blocks. It should also be noted that no chemicals apart from paint and cement, will be used onsite during construction. In terms of operations, people that might be involved in the trading of chemicals will be advised to adhere to ZEMA regulations on storage and importation of chemicals.

f) Maintenance of Machinery

No temporary workshop facility will be constructed on site for the maintenance of construction vehicles and machinery. The machinery will only be brought on site during the time that their use will be inevitable. After use, they will be taken back to the workshop within Lusaka. The fuel will also be stored at the same workshop.

g) Movement of Construction Traffic and Heavy Machinery

Transportation of construction materials and waste to and from the site will involve the movement of heavy vehicles on access roads to the project site as well as within the site. Daily transportation of construction workers will also add to the volume of construction traffic to the site. Construction activities such as clearing, excavation, earth moving and mixing of concrete will involve the movement and operation of heavy plant and equipment on and around the site. In order to control congestion, management will ensure that construction vehicles allowed onsite per time are minimised. This will be done to ensure that congestion is avoided and also to ensure that there is efficient use equipment and machinery.

h) Construction Workers Activities

Although no labour camp is planned in the project area, social interaction activities will undoubtedly result between project workers and local communities. The project will as much as is possible hire labour from within local communities. Local market transactions will take place between construction workers and local communities. Casual sexual relationships may also result from interactions between workers and the community. The presence of construction workers will require the provision of water for food preparation and domestic purposes as well as the provision of sanitation and health services.

i) Water Abstraction

As mentioned earlier, water will be required for construction, workers domestic and dust suppression measures. Water will be abstracted from on site water system provided to the existing facility.

j) Waste Management

Waste management during the construction phase will include:

- Provision of temporary workers sanitation.
- Collection and disposal of domestic waste at ZEMA approved disposal sites.
- Transportation and disposal of building waste and rubble.
- Collection and disposal of used oils/lubricants according to ZEMA

It should be noted that waste materials will arise from left overs of the materials and also packaging materials during constructions. Other wastes will also arise from off cuts of metals and plates of especially during fabrication of the main frame for the building. Such waste materials will be offered to people involved in scrap metal buying and selling.

Installation of shopping mall furniture

The shopping mall will have to put in place furniture in the forms of signs, demarcations and lining, safety barriers, culvert beacons, traffic lights. The Project proposes to introduce all the above-mentioned furniture where appropriate.

Operational Phase

The main activities that will exist during the operation stage will be those that will relate to the specific different parts of the development. As indicated in the foregoing, the completion of each development phase will result into the commencement of the respective operation of the particular facilities. The completion of the Shopping Mall will open up new avenues to the populace for consumer shopping, trading in the tenant lots to be provided, and participation in the varied entertainment packages that will be available. Because of the availability of open paved spaces, leisure –related activities will be highly exploited.

During these operational phases, certain activities that are likely to have an impact on the environment include:

1) ***Water Supply*** As mentioned the average and maximum water demand of the project is estimated at 2,508 m^3 /day and 4,238 m^3 /day respectively to be sourced from Lusaka Water & Sewerage Company (LWSC). It should be noted that there is standby borehole at the mall which can only be used when LWSC cannot supply or when there is a problem.

2) ***Commuter Traffic*** The volume of traffic to and from the project area will increase appreciably once the project is operational. This will especially apply at peak times during the day with commuter traffic and during peak shopping periods such as weekends.

3) ***Commercial Activities*** These will include retail activities at the commercial node.

4) ***Leisure Activities*** This includes activities like the shopping, and other entertainment facilities including restaurants.

5). ***Estate Management Post Construction*** Activities relating to estate management will include:

Waste Management
Solid waste management from the commercial node will be the responsibility of the centre management who will ensure that the area is at all times clean and tidy. The facilities provided for the separation of waste for recycling and storage will be in enclosed and caged skips to prevent materials from being blown away from the site. An approved contractor for disposal in accordance with Lusaka City Council (LCC) and ZEMA regulations will collect waste regularly.

Sewer & Storm Water Management Sewer line maintenance will include routing and flushing the sewer mains, service calls on potentially blocked mains, repair of damaged mains, and flushing driveway culverts. It should be noted that for the sewer, Lusaka Water and Sewerage will service the building. For the storm water management, drains will be made in such a way that they also connect with the one existing at the moment to avoid the floods.

Electrical Maintenance & Management The electrical distribution system will be monitored and maintained on a day-to-day basis. This will be up to the distribution board at each facility. All internal electrical maintenance will be the tenant's responsibility and must be carried out by an approved electrical contractor.

Water Management The water reticulation system will be monitored and maintained on a day-to-day basis in conjunction with the LWSC. All

internal water supply maintenance will be the responsibility of the owners and will be carried out by an approved plumbing contractor.

***Vector/Pest Control (mosquitoes and cockroaches*):** One of the most effective methods of vector control is Indoor Residual Spraying (IRS). In this method, the inside walls of mall are sprayed with residual insecticides. Contact with the walls by any of the pests results in their death immediately or soon afterwards. The other effective method of mosquito control is that a person sleeps under insecticide treated nets (ITNs). The ITN works not only by creating a barrier between the mosquito and its intended victim, but also by killing the mosquito if it gets into contact with the net. The Management will contract for the annual spraying of public areas of the mall with appropriate pyrethroids to control mosquitoes and bi- annually with approved pesticide for the control of cockroaches.

Decommissioning and Closure

As is the case in all the projects, the last phase of the project is decommissioning phase. For this project, the decommissioning phase will involve the transformation of the structures from being used as shops into being used for something else that will be decided upon at that time. This will thus involve the rehabilitation of the structures because they would not be demolished. Permission would also be sought at that time from the City Council, so that the structure could be used for that particular use that will be decided. Other activities will involve the dismantling of the furniture and fittings and also demarcations which will have been made.

Decommissioning and closure is dependent on economic and technological conditions after the 40-year Project life.

Table 4.1A Estimated costs:

Activity	Estimated Cost (US$)
Rehabilitation of the structures	30,000.00
Facilitation of the dismantling of the partitions and fittings	20,000.00
Local labour charges	15,000.00

4.1 Interested and Affected parties

Twin Palm Shopping Mall has held a series of external stakeholder meetings and briefings to achieve high level awareness and support for the project. The meetings have been held In Lusaka with representatives from the Government and local administration. During the baseline study for the Environmental Project Brief, identified Stakeholders were informed about the project in general and the environmental work involved.

Twin Palm Shopping Mall's overall communication strategy is to maintain an ongoing dialogue with key stakeholders via 'Local Stakeholder Meetings', capturing feedback and providing tailored and timely responses in a continuous loop. A Stakeholder

Communication Plan will be prepared which will include plans for reporting on the progress of the project and for stakeholder visits and engagement.

4.2 Labour

A good number of people will be employed during the implementation of the project. During construction, 50 people will be employed. Of this number, 6 will be skilled and 10 semi-skilled workers and 34 will be unskilled labourers. For the operations stage, quiet a good number of people, more than 60, will be employed by the various companies that will be operating at the mall.

4.3 Transport

Trucks will be used to fetch raw materials from within the country and also from outside the country. Twin Palm Zambia will also encourage the local people to provide the materials required.

5.0 DESCRIPTION OF SITE ENVIRONMENT

5.1 Location

The project site is located in Lusaka, please refer to Figures 5.1, 5.2 and 5.3. The area is generally flat, paved and cleared of vegetation. The site currently has the mall constructed under Phase 1. The larger part of the site has been paved leaving a portion on the western side, close to the builders' pub, that will now form site for the extension of the car park. The site is located at the corner of Simon Mwansa Kapwepwe Road and the road going to Salama Park, right opposite Citizen University (or former Tina Trust School).

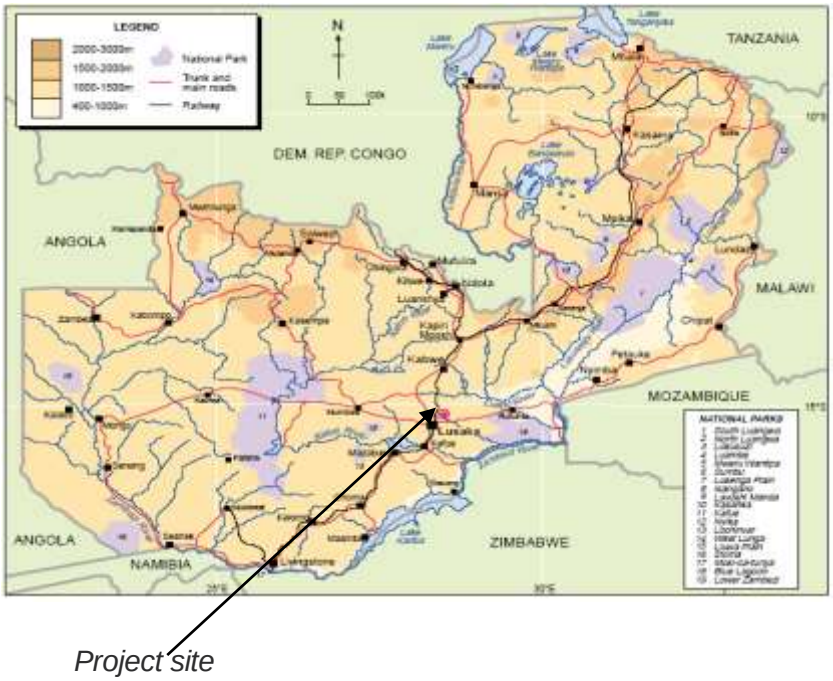

Figure 5.1. Location of the Project Area

The property is centered around coordinates: 15°23'19.42" 28°23'34.46" E (WGS 84 Datum).

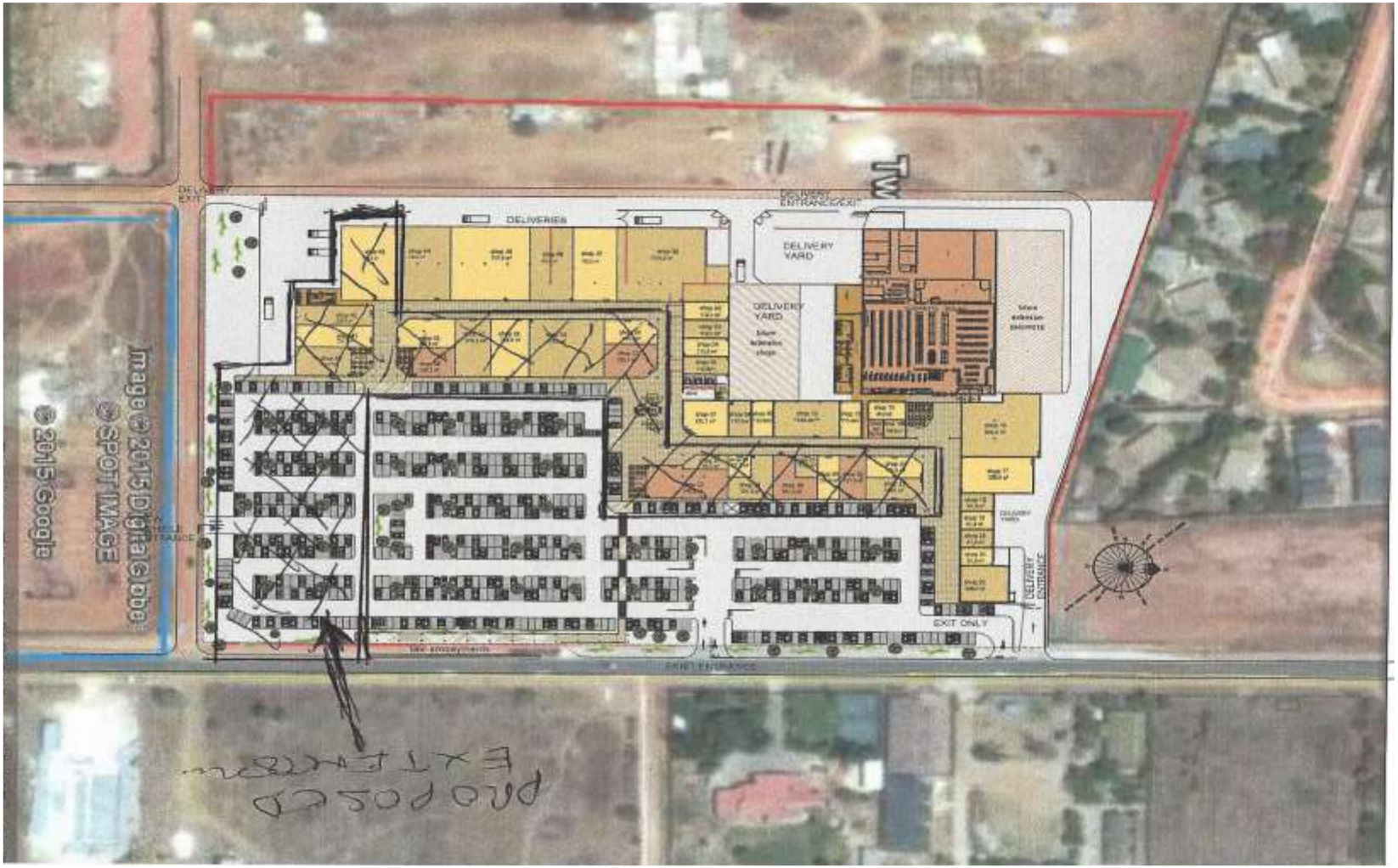

Figure 5.2 Showing the image of the Project Site

Figure 5.3 showing the Google map of the Mall

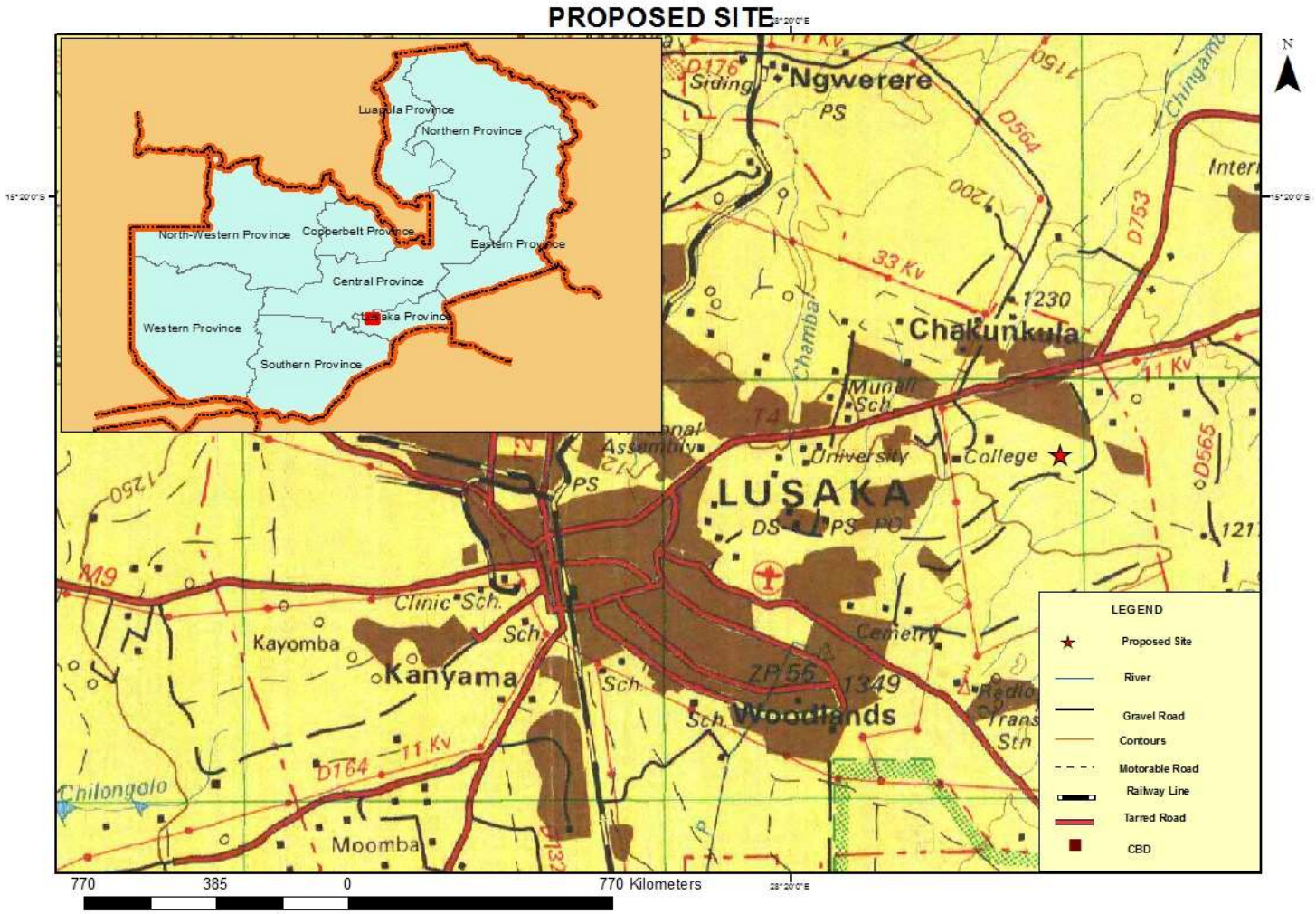

Figure 5.4 showing the Location of the Project

5.2 Topography

The topography of the project site is generally flat with an average altitude of about 1189m above sea level. The terrain gently loses altitude in a west-easterly direction. The site has no streams or rivers nearby.

Plate 1 showing the Topography of the Project site

5.3 Climate

Data from the Lusaka Weather Station, located at the Kenneth Kaunda International Airport (KKIA) was used to define the regional climate and local weather conditions. The KKIA Station is located at an altitude of 1270m and, because of similarities in altitude, topography and proximity, is considered representative of conditions at the project area.

Average annual rainfall is approximately 1250mm, with the majority falling during the summer months of November to March. As indicated in Table 5.1, the 84-year average precipitation for a 24- hour event has been recorded at 28.6cm in January with the lowest being 0.2 in September. (Lusaka Met Station 1974-2002).

Table 5.1 Average Precipitation for the Lusaka Met. Station

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
cm	28.6	24.3	17.8	3.7	0.4	0	0	0	0.2	2.5	13	27.8

Source: www.weatherbase.com

This climate is characterized by relatively high temperatures and evenly distributed precipitation throughout the year. In summer, Lusaka is largely under the influence of

moist, maritime airflow from the western side of the subtropical anticyclonic cells over low-latitude ocean waters. Temperatures are high and can lead to warm, oppressive nights. Summers are usually somewhat wetter than winters, with much of the rainfall coming from convectional thunderstorm activity; tropical cyclones also enhance warm-season rainfall in some regions. The coldest month is usually quite mild, although frosts are not uncommon, and winter precipitation is derived primarily from frontal cyclones along the polar front. The average temperature for the year in Lusaka is 21.1°C. The warmest month, on average, is October with an average temperature of 25°C. The coolest month on average is June, with an average temperature of 16.7°C.

The highest recorded temperature in Lusaka is 37.2°C, which was recorded in November. The lowest recorded temperature in Lusaka is 0°C, which was recorded in June.

The average amount of precipitation for the year in Lusaka is 899.2 mm. The month with the most precipitation on average is January with 200.7 mm of precipitation. The month with the least precipitation on average is May with an average of 10.2 mm. There are an average of 60.0 days of precipitation, with the most precipitation occurring in January with 13.0 days and the least precipitation occurring in June with 0.0 days.

In terms of liquid precipitation, there are an average of 60.0 days of rain, with the most rain occurring in January with 13.0 days of rain, and the least rain occurring in June with 0.0 days of rain.

Table 5.2: Average relative temperature

Month	Average Temperature	Average High Temperature	Average Lower Temperature	Highest Recorded Temperature	Lowest Recorded Temperature
January	21	27	16	30	12
February	21	27	16	30	12
March	21	27	16	30	12
April	21	27	16	30	12
May	20	28	13	30	7
June	16	25	7	28	
July	18	27	8	31	-2
August	21	31	12	33	1
September	21	32	15	36	5
October	24	32	15	36	9
November	23	30	16	34	12
December	22	28	17	31	11

Source: www.weatherbase.com

Average relative humidity rises from October to February and thereafter drops to as low as 30% in September.

Table 5.3 Average relative Humidity for a 3 Year Period

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
%	75	75	69	61	52	47	43	36	30	33	54	71

Source: www.weatherbase.com

Wind directions are dominated by winds from the northeast through to the southwest with maximum gusts ranging from 30 m/s in summer to 22 m/s during the winter months.

Ambient air quality in Lusaka is generally influenced by a number of different sources of air pollution. These include industrial sources, brick ovens, domestic fuel burning and veld burning for agricultural purposes and vehicle entrainment of dust on unpaved roads. Motor vehicles emissions also have some impact on air quality. Biomass burning from July to September on a regional scale elevates the ambient concentrations from local sources.

Ambient air quality data is not available for the project site. However, observations made during visits showed that the air was generally good. Visibility was not Impaired no foul smell was observed. Some individuals working in the environs of the project site were interviewed whether they have been affected by any form of air pollution. The answer was that they have not been affected so much apart from occasional dust emissions from plant operations and burning activities.

The project site being located in the central business area is vulnerable to noise pollution. Key sources observed included vehicular traffic, and occasional train movement. However, noise levels are generally low. Snap survey conducted during the day around the project site using a Decimeter showed noise levels ranging 50- 85 dB. The main source of noise peaks observed was vehicular movement.

5.4 Geology and soils

The project site is underlain by the meta-sediments of the late Proterozoic Kundelungu Group, which has been intruded by younger granite. The Kundelungu Group comprises limestone, shales, argillites and siltstones. Bedrock outcrops are rarely occurring. Exposed lithologies and float material are mostly shales, siltstones and silty sandstones of the Proterozoic Kundelungu System that have been intruded by post-orogenic granites, as noted above.

5.5 Vegetation

The Lusaka region belongs naturally to the savanna-woodland type with significant areas being agriculturally and horticulturally cultivated. The vegetation of the Lusaka Province, is covered with 80% Miombo Woodlands (*Brachystegia- Julbernardia*), which include *Brachystegia longifolia, Isoberlinia angolensis, Albizia adianthifolia, Ficus brachylepis and Uapaca kirkiana* as the key tree species. Grass mainly comprise of the *Hyperrhenia* and *Digitaria* species which include Elephant Grass (*Pennisetum purpureum*).

The project site however, is a brown field, designated as commercial area whose anthropogenic activities continue to impact on the floral species of the area. There is no vegetation at the project site owing to the earlier activities at the site.

Plate 2 showing the vegetation at the Project site

5.6 Hydrology

The project site, as stated before, is found in a built area and there is no river nearby. There is no surface water or streams close to the project site.

Plate 3 showing the structures opposite the main entrance

5.7 Biodiversity

The area has no rivers or streams to support a wide range of aquatic ecosystem components such as algae, macrophytes, invertebrates, and fish. Also owing to the earlier use of the land, the area is devoid of any biodiversity.

5.8 Archeological and Cultural Sites

There is no known site, within the project site, which has archeological or cultural value. In the event that this is found later, management will ensure that this discovery is reported to the National Heritage Conservation Commission for conservation.

5.9 Human Settlement

The site is surrounded by Avondale, Salama Park and Chelstone Green Settlements. Thus, the development will somehow, affect these settlements in one way. This, however, will not be much in that the extension will take place at the already existing mall which is fenced off and the site is a private property and the company has title to the land. This project, will not result in resettlement of anyone.

5.10 Air Quality

The air quality in the project area is influenced to large extent by exhaust gases from vehicles in town. Though the site is in the residential/commercial area, no activity takes place that affects the air quality apart from the vehicles.

5.11 Social – Cultural and Economic Study

This project's Social and Economic Review provides a synthesis on the impacts and mitigation measures that will need to be implemented to reduce the negative environmental and social economic impacts on the communities both during the construction and operational stage of the project. The social and economic study was

undertaken as part of the requirements of the Environmental Impact Assessment Statutory Instrument No. 28 of 1997. The Statutory Instrument requires that the Project Proponent undertakes an environmental assessment to determine the environmental and social impacts and assist in determining the possible mitigation measures to reduce these impacts.

5.11.1 Demography

The project area is found within Lusaka's Avondale/Ibex Hill area and thus found in a built up area. In terms of population, Lusaka is one of the most densely populated and according to the census report of 2010; the total population of the City was 1,747,152. The people of Lusaka depend so much on trading, industrial activities and agriculture for their livelihoods. Apart from this, others involve themselves in charcoal burning. Some people are employed by the government.

5.11.2 Social Amenities and Infrastructure

The city has quite a number of social amenities. There are a number of schools in almost all the areas. For the secondary schools, most of them are day schools apart from Kasisi Girls and David Kaunda Technical School. Most of the schools in the City are government schools though the City also has a number of private schools. Other social amenities in the city include the only modern Heroes stadium.

5.11.3 Health Centers

In terms of health facilities, just like schools are many. There are a number of government and private hospitals in the City. Government hospitals include Levy Mwanawasa Hospital and UTH while in terms of clinics, there are quiet a large number. Private hospitals are many in the city also. Apart from this, government have upgraded some hospitals from clinics to mini hospitals in Chawama, Chilenje, Matero etc.

5.11.4 Road Network.

The city has very good road network though there might be areas outside town where roads are poor. The project site can be accessed by tarred roads Simon Mwansa Kapwepwe and then turning into the road going to Salama Park. The site is found a few meters from the junction of Simon Mwansa Kapwepwe and the road going to Salama Park.

Plate 4 showing the neighbouring structures

5.11.5 Power

There is Zesco power already connected to the shops at the mall. As such, power will be extended to the extension of the mall once completed.

5.11.6 Telecommunication

In terms of communication, it should be noted that all the mobile networks are available in Lusaka and the project site as well. For the radio networks, both private and public stations can be connected. Private stations include Radio Phoenix.

5.11.7 Sewerage and Site Drainage

Sewer comprises standard construction in 110mm PVC pipes and manholes designed for easy connectivity at the back of the building should additional toilets be required. The site sewer connects into the Lusaka Water & Sewerage mains and the extension project will also be connected to LWSC. Stormwater collected from the roof and site paving is drained into existing city drainage via rain water gutters and down pipes and on-grade concrete drains.

5.11.8 Traffic Situation

Traffic study indicated that there quiet a number of traffic flowing the main road in front of the main entrance. The situation is even worse during the weekends when most families visit the mall for shopping. Expanding the mall would thus entail increase in traffic further. To control congestion on the main entrance route, the management have planned to open new entrances to the mall by putting provision on the western side. This, thus would enable motorist coming to mall using the back route through Chelstone Green. This will also enable people coming from Salama Park and also Chelstone Green to avoid to the main entrance by using the new created entrances.

6.0 PROJECTED ENVIRONMENTAL AND SOCIAL IMPACTS

The overall framework that has been used for evaluating impacts is the source-pathway-receptor framework. This framework provides a basis for examining how environmental impacts can occur and suggests that a good starting point for the evaluation of impacts is to identify the potential sources of impact.

In line with this framework, the ISO 14001 Environmental Management Systems standard suggests that environmental planning should begin with the identification of environmental aspects which are defined as being any element of an organisation's or project's activities, products, or services that can interact with the environment. A significant environmental aspect is defined as one that "has or can have a significant environmental impact", where an environmental impact is defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's or project's activities, products or services.

The impacts evaluation stage began with the identification of the project activities and related inputs and outputs, for each phase (site preparation, operation and decommissioning) of the proposed project. This was followed by the development of a list of potential environmental aspects associated with the project activities.

For each of the potential environmental aspects identified relevant criteria were used to determine the significance of the aspect and hence the potential impact associated with each aspect.

6.1. Project Aspects and Impact Ratings

In order to determine the potentially significant environmental impacts, either positive or negative, associated with the environmental aspects identified, a simple rating system was used, as follows:

- L - low environmental impact associated with the aspect
- M - medium environmental impact associated with the aspect
- H - high environmental impact associated with the aspect

Where impacts are of a positive nature these impacts have been identified by the use a plus sign i.e. L (+), M (+) and H (+).

In deriving impact ratings associated with each environmental aspect the following criteria were used:

- Potential to harm or benefit human health or the environment;
- Compliance with regulations, legislation and standards;
- Frequency/severity of environmental impact associated with the environmental aspect;
- Degree of community concern; and
- Impact on sensitive receptors.

6.1.1 Site Preparation phase /Construction of the Premises

Aspect	Impact Rating	Environment Component
Employment	M (+)	Economic
Waste generation	L	Soils
Transportation	L	Air Quality
Energy usage	L	Climate
Water consumption	L	Hydrology
Spills and leaks	L	Soils/Hydrology
Occupational health	L	Health and Safety

6.1.2 Operation Phase

Aspect	Impact Rating	Environment Component
Employment	H (+)	Economic
Transportation	M (+)	Economic & Air Quality
Noise generation	L	Noise
Dust generation	L	Air Quality
Waste generation	L	Soils
Spills and leaks	L	Soils
Run-off	M	Hydrology/ Flora and Fauna
Occupational health	L	Health and Safety
Soil contamination	L	Soils
Cultural heritage	L	Archaeology and Cultural Heritage
Raw materials consumption	H	Economic & Health and Welfare

6.2 Environmental Impacts

Identification of potential project environmental and social impacts is based on the detailed design of the Project, Project Description, the Environmental Baseline Study and industry experience. Management actions proposed to mitigate project impacts are based on best industry practice but adapted where appropriate to satisfy Zambian environmental and social conditions.

6.2.1 Bio-Physical Environment

6.2.1.1 Climate

No significant environmental impact on climatic conditions is expected as a result of project activities. This is because no products will be generated which would cause climatic change concerns.

6.2.1.2 Geology

No significant environmental impact on geological conditions is expected as a result of project activities. This is because the project does not involve the removal of ground but just make use of the already made foundations on site. All geological conditions will remain in place.

6.2.1.3 Soils

The establishment of the project at the proposed site and the operation of the project are expected to have environmental impacts on soils at the site if no mitigation measures are put in place. Soil contamination could arise during construction especially due to oil spills from construction vehicles.

During operations, soil contamination can also take place from accidental oil spills from the vehicles especially if the site is not paved. Soils could also be contaminated if during operations, waste materials from the operations are not disposed off properly.

Management will ensure that during construction, equipment are properly serviced to avoid leaking of oils. The company will also ensure that contractors use hand held equipment apart from the cranes especially when dealing with heavy materials. During operation, most part of the site will be paved to avoid soil contamination.

6.2.1.4 Land Use

No significant environmental impact on land use is expected as a result of project activities. This is because after the farm was sold by the Bank, the new owners changed land use from agriculture to its current use. Thus no conflict is expected from anyone.

6.2.1.5 Air Quality

A low potential environmental impact has been assigned to aspects that may impact on air quality identified for the preparation phases and the operations. This is due to the fact that the roads adjacent to the site are tarred, so increases in traffic resulting from project activities should not generate significant amounts of dust. Furthermore, it will be a stipulation within the construction works contract that the contractor responsible for works will adopt dust suppression methods, as appropriate, during construction works.

6.2.1.6 Noise

Baseline noise monitoring undertaken as part of this EPB indicated that noise levels at the proposed project site are generally low. It was observed that the main sources of noise at the project site were traffic, including heavy vehicles using the main road. Construction activities will naturally produce some noise, and it is therefore considered that the project will have a significant short-term impact on noise levels at the project site. To address this issue appropriate noise mitigation measures will be instigated during the construction works in an attempt to minimise noise pollution arising from construction activities. This will include fencing off work areas.

6.2.1.7 Hydrology

The proposed project site slopes gently downwards towards the east, towards the natural drainage. There is, therefore, the potential for the natural drainage to become impacted by run-off during the project works.

6.2.1.8 Hydrogeology

No significant negative environmental impact on hydrogeological conditions is expected as a result of project activities. This is so because, the company will ensure that all waste water at site is collected and channelled through the Lusaka Water & sewer system so as to prevent groundwater pollution. The sewer system will be constructed with sound materials that will not allow waste water to infiltrate the ground.

6.2.1.9 Flora and Fauna

The project will not have a significant negative impact on terrestrial flora and fauna in the area as the project site is already substantially degraded due to prior human activities.

6.2.1.10 Archaeology and Cultural Heritage

There is no known site at and within the project area that has archaeological or cultural value. In the event that this is found later, management will ensure that this discovery is reported to the National Heritage Conservation Commission for conservation.

6.2.2 Socio-Economic Environment

This section of the report highlights the potential socio-economic impacts of the project with particular reference to the project site and the host community.

6.2.2.1 Economic

In relation to the project under consideration, the main positive economic impact of the project works will be the employment of local residents (for instance, in site preparations/construction activities and project operations). It is, therefore, thought likely that the provision of employment during construction works and operations of the project will be one of the beneficial impacts of the development. It will also help lessen congestion especially due to availability of shops where to buy from. The project will also help lessen street vending as space for renting will be available.

6.2.2.2 Solid Waste Management

Improper disposal of solid waste at the site could impact negatively on the environment and this needs to be addressed. Companies providing solid waste collection services in the city will be engaged. Such companies will be registered waste transporter with ZEMA, to help with waste collection.

6.2.3 Other Social Economic Impacts

Development of this project will:

- Create employment thereby reducing poverty levels;
- Create business opportunities like ready market for the supply of various assortment of things that people who will rent the shops will be selling; and
- Contribute to enhancing the nation's economy through taxes.

7.0 MEASURES TO MITIGATE NEGATIVE IMPACTS

According to the methodology described in the preceding section, the potential positive and negative environmental and social impacts of the project have been identified. Potentially negative impacts need to be addressed by appropriate mitigation measures and some potential mitigation measures have already been outlined.

Mitigation measures addressing each of the potentially negative environmental impacts of the project are presented within the Project Environmental Management Plan (EMP), which has been developed to ensure that adequate health, safety and environmental safeguards are in place during project implementation. In assessing the suitability of various mitigation measures consideration has been given to stakeholder views and the relative costs of the mitigation measures.

The identified mitigation measures are based on the following principles:

- Protection of human health and safety;
- Regulatory compliance;
- Pollution prevention or minimisation through process design, equipment selection and best practice operational methods; and
- Maximising social and economic benefits.

7.1 Soils

All the surroundings of the project site is paved and as such, it does not pose any threat to soil contamination. In case of an oil spill, it would be easy to clean up the site.

7.2 Surface Water

Monitoring of the surface water will be done all the time (every week) to ensure that before the water is disposed off, it would not affect the ground water quality. The waste water would be channeled through the sewer system. In case of pollution, remedial measures will be put in place. During the rainy season, the surface runoff from the site will be controlled to ensure that surrounding environment is not affected by the operations of the project.

7.3 Groundwater

To reduce the possibility of groundwater contamination, the effluent quality will be monitored and neutralised in case it's polluted. It should actually be noted that the operation will not produce any effluent that will be of concern.

7.5 Air Quality

The project site is paved with concrete. As such, the area will not be able to produce any issue of concern as far as the ambient air is concerned. .

7.6 Noise

Noise generation will be kept to a minimum. There is no use of equipment that would generate noise.

7.7 Landscape, Visual Characteristics and Security.

Please note that the construction of the shop will help beautify the area as the area was not looking good after the demolishing of the former building. The project will help in the sense that it posed security concern especially in the night.

Table 7.1: Environmental Management Plan

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	COST (USD$)
Preparation/Construction Phase						
Dust generation	To reduce air pollution	• Dust suppression measures, such as spraying with water, should be used • Screens will be erected around the site • Workers will wear dust masks when working in dusty areas	Low	On-going throughout Preparation and construction phase	• Contractor • Project Manager	10,000.00
Noise generation	To reduce risk of damage to hearing function	• construction equipment and vehicles should be switched off when they are not in use	High	On-going throughout construction phase	• Contractor • Company Project Manager	5,000.00

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	COST (USD$)
		• Working methods that do not result in noise pollution shall be adopted • Site workers should wear appropriate hearing protection when exposed to noise levels above 85 decibels				

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	(USD$)
Run-off	• To minimise the sedimentation	Site preparation activities should include the	Medium	Site preparation phase	• Contractor • Company Project	5,000.00

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	(USD$)
	of the local drainage	provision of an adequate surface water drainage system			Manager	
Cultural heritage	To reduce negative impacts on cultural heritage materials	Awareness briefings to contractor and site workers	Low	Site preparation phase	Company Project Manager	2,000.00
Raw materials consumption	To reduce health risks associated with contaminated construction materials	All sand and rock based raw materials should be screened for radioactivity prior to their use	High	On-going throughout construction phase	• Company Project Manager • Project Architect/ Consulting Engineer	2,000.00
OPERATION PHASE						
Occupational Health and safety	To reduce health risks to workers	a) Workers should be provided with adequate PPE	High	On-going throughout operation phase	Company Project Manager	10,000.00

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	(USD$)
		b) Workers should be given appropriate health and safety training				
Noise generation	To reduce risk of damage to hearing function as a result of equipment operations	• The company will put up a maintenance programme to ensure that all equipment is in good condition.	High	On-going throughout operation phase	Project Manager	8,000.00
Waste generation	• To minimise land contamination • To reduce air pollution	• All solid waste should be segregated and disposed of at a licensed	Low	On-going throughout operation phase	Company Project Manager	5,000.00

WHAT NEEDS TO BE MANAGED (ASPECT)	WHY IT NEEDS TO BE MANAGED (IMPACT)	HOW IT SHOULD BE MANAGED	IMPACT RATING	TIMEFRAME	WHO IS RESPONSIBLE FOR MITIGATION MEASURE	(USD$)
		waste disposal site • Encourage those involved in making of blazers to collect the materials for free				
Waste water (effluent)	It can pollute the groundwater	• All the effluent from the site should be channelled through the sewerage system	Low	During project operation	Project Manager	2,000.00

7.8 Occupational Health and Safety Plan

Twin Palm Zambia will implement internationally accepted occupational health and safety standards and procedures throughout its operations. This will create a safe workplace thereby protecting its employees from accidents and sickness. The key measures involved are described in the following sections.

7.8.1 Workplace Air Quality and Temperature

Twin Palm Zambia will implement air monitoring of the work place and will also ensure that good ventilation is provided in the workplace. The condition of protective respiratory equipment and air quality monitoring equipment will be routinely checked and maintained, as well as any warning systems.

Protective respiratory equipment will be provided and worn by all employees when exposed to welding fumes, solvents and other substances present in the workplace. Respiratory protection will be worn at all times when air monitoring data indicates that respiratory protection is required. Dust masks will be issued to all employees working in areas where particulates (inert or nuisance dusts) may exceed the statutory limit of 10 mg/m^3 i.e. during the renovations stage. During operations, no air quality issue will arise from the operation but the monitoring will continue to be implemented.

OHS officers will conduct routine inspections to ensure the appropriate respiratory protection equipment is in good working condition and being used correctly.

7.8.2 Workplace Noise

All plant equipment (belonging to the project and contractor) will undergo routine maintenance to ensure it is in good working order and to minimise noise levels.

Where it is practical and feasible to do so, Twin Palm Zambia will install sound-insulation and control rooms to decrease the average noise level exposure in normal work areas.

Twin Palm Zambia will adopt the international standard of 82 decibels (dB) for exposure of its employees to noise over an 8-hour shift. Employees will wear the appropriate ear protection provided in workplaces where noise levels exceed 82 dB.

Safety officers will monitor noise levels and the use of protective equipment to ensure the appropriate and correct use of the protective equipment by employees.

7.8.3 Employee Safety - General

The general safety of employees while at work will be the responsibility of Twin Palm Zambia, except in cases where the employee was acting in a negligent and dangerous manner.

The employees will be provided with appropriate personal protective equipment as demanded by their activities, e.g. hard hats, safety boots, overalls, ear and eye protection, dust masks and gloves as appropriate.

Hazard signs will be erected or posted around the factory to warn employees and contractors of potential dangers.

Contact telephone numbers of persons and services to be notified in the event of an emergency will be posted on all notice boards.

7.8.4 Employee Training

Employees will receive specific training from accident prevention and safety officers concerning the hazards precautions and procedures for the safe storage, handling, transport and use of potentially harmful materials that are relevant to each employee's job task and work area. Employees will also receive training regarding safety, health and environmental matters including accident prevention, safe lifting practices, correct operation of equipment. This will aid in the prevention of accidents.

Training will also be given on emergency response systems and procedures including the location and proper use of emergency equipment, use of personal protective equipment, procedures for raising the alarm and notifying emergency response teams, and the proper response actions for each foreseeable emergency situation.

8.0 ASSESSMENT OF ALTERNATIVES

This section of the report includes an assessment of the identified alternatives in relation to their potential environmental impacts, social acceptability and costs where relevant.

Five alternatives were considered for this project which included No project option and alternative project site.

8.1 No Project Option

The No project option, as the analysis showed, would also have both positive and negative impacts i.e. positive in the sense that by not implementing the project, then all

the negative impacts that would arise from the project would not be generated and also negative in the sense that the positive impacts that would arise as a result of the project implementation would also not occur. Thus weighing this option, the negatives of not implementing the project far outweighs those of the positive.

8.2 Alternative Site

For the alternative site option, it would mean acquiring land from the council on which to establish the project. This would require a lot of time as there would need to make an application to the council, for the allocation of property or advertise in the papers for anyone with land to sale to the project promoter. This option, most likely, would entail finding land away from the developed commercial business centre. This option would also generate a lot of environmental impacts as vegetation would be required to be cleared before construction. Thus looking at the activities that would need to be done, it thus becomes easy to use the available place for the project. As such, this option of another site was not considered.

8.3 Type of Construction

a. Standard Block work and Steel Structure

The building is single storey in structural steel enclosed by plastered and painted concrete block work walls on concrete surface bed. The foundation are a combination of concrete pads to support the steel structure and strip footing with concrete block work walls to support the superstructure concrete block work walls . The roof covering is IBR sheets on steel trusses with sisalation insulation underneath. Shop front fixed light window openings in aluminium frames and safety glass. For this type of structure, modification of the structure would be easy to carry out and when choosing it, this was one of the conditions that was considered.

b. Concrete Panels

Precast concrete Panel is a construction product produced by casting concrete in a reusable mold or "form" which is then cured in a controlled environment, transported to the construction site and lifted into place. Precast stone is distinguished from precast concrete by using a fine aggregate in the mixture, so the final product approaches the appearance of naturally occurring rock or stone.

By producing precast concrete in a controlled environment (typically referred to as a precast plant), the precast concrete is afforded the opportunity to properly cure and be closely monitored by plant employees. Utilizing a Precast Concrete system offers many potential advantages over site casting of concrete. The production process for Precast Concrete is performed on ground level, which helps with safety throughout a project. There is a greater control of the quality of materials and workmanship in a precast plant

rather than on a construction site. Financially, the forms used in a precast plant may be reused hundreds to thousands of times before they have to be replaced, which allow cost of formwork per unit to be lower than for site-cast production.

It should be noted that this was not chosen because; modification of structures made of this type of construction is difficult.

C. Pre – Fabricated Panels

Prefabrication is the practice of assembling components of a structure in a factory or other manufacturing site, and transporting complete assemblies or sub-assemblies to the construction site where the structure is to be located. The term is used to distinguish this process from the more conventional construction practice of transporting the basic materials to the construction site where all assembly is carried out.

This type of option was also considered as an alternative option for the project. In considering this option, it was discovered that construction would be fast and that the cost would also be minimum compared to standard concrete buildings. This option was however discarded owing to the fact that durability is not there and it becomes a problem when construction is being conducted in an area that is prone to termites.

Preference of Options

The decision on the type of construction to be adopted was considered on the basis of durability and cost effectiveness. With this mind, the following was how the alternatives were rated with 1 being the preferred one.

i. Standard Concrete one – this was chosen on the basis of flexibility especially during the Closure phase of the project. The structure can easily be transformed into some other alternative use minimal cost. The other reason was that the structure is able to stay for more than 40 years.

ii. Concrete panels – this option was also chosen but could not be adopted owing to the fact that despite being durable, the structure, constructed using this type of design would actually be difficult to transform into something else. This then would restrict the usage of the building especially at closure. Cost for such structures is also high.

iii. Pre-fabricated structures – this option was good in terms cost but not adopted because it can be difficult to transform it into anything. The structure does not stand for a long time. The maximum period it can stay is about 20 years.

iv. Alternative site – the option, as stated earlier, was not chosen based on the fact that alternative site would only be found in areas not preferred by the Developer. It would also be in an area that would require clearing of the vegetation and the amount of work involved would be much. Besides, the procedure involved in the

allocation of land would take a lot of time and would thus lead to the delay in project implementation.

8.4 Source of Energy

On **electricity**, two options were considered. One option was to connect to the Zesco transformer as is the case with the phase 1 facility while the second option was to utilise the solar panels or Gensets as a source of electricity. It should be noted that the Zesco option was adopted owing to the fact that it is reliable and faster to connect except for the load shedding which is rampant in the area. Gensets then could be used as backup.

8.5 Waste Management

For the **waste management**, two options were considered. One option was where each client manages their own waste and the second option was where the company managing the facility also manages the waste as is the case with the shops currently operating onsite. Second option was considered owing to the fact that allowing all clients managing their own waste would not work well because this can lead up to congestion especially if the waste transporters were to come at the same time.

8.6 Source of Water

For the **water**, the current option is where the Lusaka Water & Sewerage Company connects the facility to the water main line and then provide a meter to each client for monitoring of usage. This option has been effective and the company would prefer this option. The other option is drilling a borehole and providing the water to the facility from the borehole. This option was not considered owing to the fact that it would increase the cost and also activities for the company managing the mall Onbehalf of Twin Palm.

9.0 CONCLUSION

The development of this project will undoubtedly bring economic development and create other business opportunities. Twin Palm has considered all potential negative environmental impacts likely to arise from this undertaking and has proposed mitigating measures. All relevant pieces of legislation will be religiously adhered to so as to enhance environmentally sound practices.

REFERENCES

1. Chidumayo E.E (1987) species structure in Zambia Miombo woodland. Journal of tropical ecology

2. Fanshawe D.B (1971) The vegetation of Zambia. First resources bulletin No. 7 Republic of Zambia.

3. Government of the Republic of Zambia; S. I. No.28 of 1997, the Environmental Impact Assessment Regulations.

4. Zambia Environmental Management Agency (ZEMA) (1999): EIA Procedures Manual.