ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

DRAFT REPORT

JRB OIL & GAS LIMITED

Proposed 315,000-liters Petrol Filling Station

At

Plot No. 186, Cadastral Zone F04 Mpape District, Bwari Area Council, Abuja FCT

Submitted to:
The Federal Ministry of Environment (FMEnv),
Mabushi, Abuja FCT.

By

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Status Page

Title: **Final Environmental Impact Assessment (EIA) Report**

For

JRB Oil & Gas Limited

Proposed 315,000 liters Storage Capacity Petrol Filling Station

Plot No. 186, Cadastral Zone F04 Mpape District, Bwari Area Council, Abuja FCT

Originator: *JRB Oil & Gas Limited*

Author: *JRB Oil & Gas Limited*

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Security: None

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February, 2026	Whole Document	Draft Report

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Declaration

Pursuit to its corporate policy on the environment, JRB Oil & Gas Limited hereby, declares its intention to carry out this Environmental Impact Assessment (EIA) of the proposed Petrol Filling Station located at Plot No. 186, Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT.

JRB Oil & Gas Limited shall take full responsibility for the protection of the proposed project area and its associated social environment and facilities around it, in compliance with all the applicable international, national, state and local government laws and regulations and/or by laws.

Approval Sheet

ENVIRONMENTAL IMPACT ASSESSMENT

This is to certify that the Environmental Impact Assessment (EIA) Report for the proposed JRB Oil & Gas Limited Proposed Petrol Filling Station site located at Plot No. 186, Cadastral Zone F04 Mpape District, Bwari Area Council, Abuja FCT. has been reviewed and approved by the Federal Ministry of Environment (FMEnv), Abuja.

Review Officer:
Sign……..…Date……..……
FMEnv, Abuja

Proponent: Sign……Date……..……
JRB Oil & Gas Limited
Mpape, Bwari Area Council, Abuja-FCT.

Consultant: Sign…… Date…….…….
Geofteda Ventures Nig. Ltd, Abuja

Table of Contents

List of Tables

Lists of Figures

Lists of Plates

Acronyms and Abbreviations

AEDC	Abuja Electricity Distribution Company
AEPB	Abuja Environmental Protection Board
AGO	Automotive Gas Oil
a	Amphibolite
an	Anddesites
ATC	Approval to Construct
b	Basalts
BAT	Best Available Technology
BOD_5	Biochemical Oxygen Demand
BS	Base Saturation
CEC	Cation Exchangeable Capacity
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
DPK	Dual Purpose Kerosene
DPR	Department of Petroleum Resources
EA	Exchangeable Acidity
EC	Exchangeable Cautions
ECS	Employees Compensation Scheme
ECEC	Effective Cation Exchangeable Capacity
EGASPIN	Environmental Guidelines and Standards for Petroleum Industry in Nigeria
EHSS	Environmental Health Safety and Social issues
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESA	Environmentally Sensitive Areas
FCT	Federal Capital Territory
FEPA	Federal Environmental Protection Agency
FGN	Federal Government of Nigeria
FMEnv.	Federal Ministry of Environment
gg	Granite Gneiss
GPS	Global Positioning System
H_2S	Hydrogen Sulphide
ISO	International Standard Organization
lg	Leucocratic Granite Gneiss Leucocratic Granite Gneiss
ig	Intrusive Granite Coarse Grained Granite
LPG	Liquefied Petroleum Gas
m	Marble
mg	Migmatitic Gneiss
mi	Migmatite
JRB	New Brand Ford Petroleum Limited
NESREA	National Environmental Standards Regulations & Enforcement Agency
NMDPRA	Nigerian Midstream and Downstream Petroleum Regulatory Authority
NNPC	Nigeria National Petroleum Corporation

OHS	Occupational Health and Safety
OM	Organic Mater Content
pe	Pegmatite
pg	Porphyroblastic Granite Gneiss
PMS	Premium Motor Spirit
PSD	Particle Size Analysis
py	Quartz Feldspar Porphyry
qz	Quartzite
q	Quartz vein
ry	Rhyolites
SH	Schist
SO_2	Sulphur Dioxide
SON	Standard Organisation of Nigeria
TCN	Transmission Company of Nigeria
TN	Total Soil Nitrogen
TSP	Total Suspended Particle
VOC	Volatile Organic Compounds
WHO	World Health Organisation
WSF	Water Solution Fraction

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Executive Summary

ES1: Introduction

This report presents the findings of environmental Impact Assessment (EIA) on the proposed site for **JRB Oil & Gas Limited** petrol filling station, located at Plot No. 186, Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT. The Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) as part of its permitting process requires projects of this nature to conduct Environmental Impact Assessment (EIA) of the proposed development.

Geofteda Ventures Nig. Ltd. an accredited consultant with the Federal Ministry of Environment (FMEnv), Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA), National Environmental Standards Regulations & Enforcement Agency (NESREA) and Abuja Environmental Protection Board (AEPB) was commissioned *by* JRB Oil & Gas Limited to conduct the Environmental Impact Assessment of the proposed site for the petrol service station in line with the EIA Act CAP E12 LFN 2004 and the Revised Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN, 2018) and the NMDPRA Guidelines for Approval to Construct and Operate Petroleum Products Filling Station (2015).

Objectives of the Environmental Impact Assessment (EIA)

EIA is an interactive process (fig.1.1) and specifically aimed at following:

a. Identification and analysis of the interaction between project activities and environmental components;
b. Mitigation of significant adverse impacts;
c. Proposition and evaluation of alternatives;
d. Formulation of an environmental management plan, and
e. conclusions/recommendations for decision-making authorities.

The Proponent

JRB Oil & Gas Limited is an emerging company with interest in venturing in the oil and gas business through distribution and retailing of petroleum products. The company is incorporated under the Companies and Allied Matters Act, 1990 as a private company limited by shares dated 29th, day of November, 2012. One of the major objectives of the company is the business of selling and distribution of petroleum products (PMS, AGO, DKP, LNG & LPG inclusive).

The proponent (JRB Oil & Gas Limited) intends to construct a petrol filling station with combined capacity of Three hundred and fifteen thousand (315,000 liters) liters storage and dispensing facilities. Other structures planned at the site include the station administrative/sales building, a separate building to house power generating plant and canopies over the pumps island. Initial construction activities include excavation of the soil for burying of storage tanks and for installation and lying of pipes.

Proposed Project Location

The proposed project is located at Plot No. 186, Cadastral Zone F04 Mpape District, Bwari Area Council, Abuja FCT. The GPS location at the center of the site is between Latitude 9° 7'7.01"N and Longitude 7°27'8.20"E on elevation of 979.9 meters above sea level on an area of 7,186.68m2.

Regulatory and Legal Framework

The Environmental Assessment compliance criteria used in the EIA was based on the following legal framework: -

- The Petroleum ACT, CAP P10, LFN 2004.
- National Policy on Environment (1989).
- Environmental Impact Assessment (EIA) Act CAP E12 LFN 2004.
- The Nigerian Urban and Regional Planning Act CAP N138 LFN 2004.
- Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) of 2018.
- National Environnemental Protection (Effluent Limitation) Régulations 1991 IS.I.8.
- National Environmental (Sanitation and Waste Control) Regulations, 2009 1S.I.28.
- National Environment Protection (Management of Hazardous and Solid Wastes). Regulations 1991. (S.I.15).
- National Environmental Standards and Regulations Enforcement Agency (NESREA) (2007).
- National Oil Spill Detection and Response Agency (NOSDRA), 2006
- Nigerian Oil and Gas Industry Content Development Act 2010
- Public Health Law CAP 103 LFN 1990
- Workers Compensation Act 1987
- Trade Union Amendment Act, 1995
- Abandonment Guidelines (FMEnv Abandonment Guidelines, 1995)

- Engineering codes and standards
- Labour Act (Cap L1 LFN 2004)
- The Fire Service Act CAP F29, LFN 2004
- Harmful Waste (Special Criminal Provisions) Act No 42 of 1988 (amended in 2004).
- National Environmental (Noise Standards and Control) Regulations, 2009 (S.I.35).
- National Environmental (Control of Bush/Forest Fire and Open Burning) Regulations. 2010 (S.I.15).
- National Environmental (Surface and Groundwater Quality Control) Regulations. 2010 (S.I.22).
- The AEPB Act 10 of 1997 and Section 17-20 of the Solid Waste Control/ Environmental Monitoring Regulation.
- Endangered Species Act, CAP E9, LFN 2004
- Occupational Health and Safety Act (Factories Act Cap 126, 1990).
- The National Building Code, 2006.
- National Health Act, 2014.
- Employees Compensation Scheme, 2010.
- Vienna Convention for the Protection of the Ozone Layer (1958).

Scope and methodology

The EIA study was based on the work scope, available data, relevant environmental laws/regulations and environmental considerations. Screening and scoping exercise was carried out using the checklist method to identify and evaluate the relevant environmental parameters vis-à-vis the nature of proposed project.

The use of maps, interviews, existing literature and laws, field sampling, survey and laboratory analysis of samples collected were adopted in carrying out environmental baseline studies. These data were used to generate information on the state of existing environment.

ES 2: Project Justification

The Need for the Project

Petroleum products (PMS, DPK & AGO) have huge benefits in their day-to-day use as energy, particular for powering engines, cooking and heating.

From this perspective therefore, a petrol station if appropriately constructed and operated will not only positively impact on its immediate community both socially and to a certain extent economically, but more importantly it is performing a vital function of bridging the end user with the supplier and by

so doing contributing to the efficient running of this vital sector of the economy. This is achieved through the provision of a convenient fuel filling and vehicles repair around the community.

Benefits of the project

The establishment of JRB Oil & Gas Limited at Plot No. 186, Cadastral Zone F04 Mpape District, Bwari Area Council, Abuja FCT will ease accessibility to petroleum products to inhabitants of the neighborhood. This will lead to creation of jobs for the teeming population of unemployed persons in the project area. This will in turn leads to reduction in crimes because the people will gainfully be engaged. The transfer of the technology to be adopted will also lead to an improvement in the social and economic life of the people in the project area of influence. This investment should be given a high priority.

Value of the project

The total value of the project that becomes part of the local economy comprises the sum of the investment, the direct value as well as the associated values from the operations of the project. The total value of the proposed petrol filling station project is one hundred and fifty-five million naira only (₦155,000,000.00). The life span of the project is placed at greater than 25 years. Thus, the value of the project to the national economy includes the direct investments, as well as the value-added returns that are accruable in implementing the project, such as improved employment opportunities and better living conditions for the host communities.

Envisaged Sustainability

Environmental sustainability

- All facilities will be designed and / or constructed to keep environmental impact at acceptable levels,
- All project activities will be executed task by task in order to ensure maximum safety during the site construction and throughout the period of the project, and,
- The filling station project shall comply with all setbacks required by the Town Planning Regulations.
- This project would have some potential negative impacts on the environment. However, incorporating the findings and recommendations of this EIA, and implementing an effective Environmental Management Plan, at the planning, design, construction,

operation stages of the proposed projects, will ensure its environmental sustainability.

Technical Sustainability

The filling station shall be built, operated, and maintained to acceptable industry standards. The proposed project would therefore be technically sustainable in view of the proven technologies to be adopted by the project proponents, with strict adherence to the Engineering design, construction standards and codes of practices at any substation, the technologies to be adopted is to adhere strictly to local and International Regulations (such as SON and ISO) for best quality, durability, accurate operational signal, command flexibility & tolerance-accuracy.

Social Sustainability

Social sustainability of the project is hinged on the policy of ensuring cordial relationship with stakeholders and communities by the contractor and the proponent through consultation throughout the various phases of the project. It has also been planned that local people will be given priority in terms of employment both in the construction and operation phase of the project implementation.

Economic Sustainability

The Petrol Filling Station shall exist for an estimated period of 25 years. It is therefore anticipated that the construction of the project will positively enhance the Economic life of the project area whose daily Economic activities require alternative source of fuel for both domestic and other uses. This would in turn ensure returns on investment to the project owners.

In addition, the project has local and national economic values in terms of employment opportunities for various categories of Nigerian professionals, skilled and semi-skilled craftsmen, business opportunities and additional revenue for the government.

Consideration of Project Development Alternatives

The No Project Option

The Delayed Project Option

The Site Relocation Option

The project may proceed as proposed option

ES 3: Project Description

The design of the proposed petrol station encompasses the construction of station building and canopy over the pumps island, the installation of seven (7) cylindrical underground storage tanks of 45,000 liters each with combined capacity of 315,000 liters. The pumps island will consist of 16 nozzles dispensing pumps with PMS having 15 pumps while AGO has a dispensing pump. Other structures planned at the site include a separate building to house power generating plant. Initial construction activities include excavation of the soil for burying of storage tanks and for installation and lying of pipes.

It is important to note here that this facility has no production line or units but have storage and refueling facilities.

Proposed Project Location

The proposed project is located at Plot No. 186, Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT. The GPS location at the center of the site is between Latitude 9° 7'7.01"N and Longitude 7°27'8.20"E on elevation of 979.9 meters above sea level on an area of 7,186.68m2.

Highlights of site analysis and adjoining land uses

The analysis conducted confirms that the site has the following characteristics:

- Site is accessible from the busy Murtala Mohammed Way (Kubwa Express Way) from south.
- The site is adjoined due west by AFDIN Petrol Filling Station and due east and north ward by undeveloped farm land.
- There are no encumbrances on the land.
- The plot is not revoked.
- It does not obstruct traffic circulation within the vicinity.
- Site is not on a flood plain neither is it liable to flooding since it is not directly adjoined to the stream.
- There are no records of earth movements or instability in the soil conditions around the site.
- The proposed petrol station has not violated the building line or the general physical character of the site,
- The proposed site will not generate waste and effluents that will inhibit the aesthetics and general environmental character and quality of the immediate developments.
- It will not generate noise that has adverse effects on the neighborhood.

ES 4: Description of Existing Environment

This information is primarily derived through:

(a) Field data collection
(b) Interactive interviews and discussions
(c) Literature review
(d) Laboratory analysis of data collected

The scope of the study is divided into (8) study areas, namely

- Climate and Meteorology
- Geology and hydrogeology
- Air quality, Noise and Dust Emission
- Soil
- Water Studies
- Vegetation and Wildlife
- Land use
- Socio-economic and health

The approach adopted in collecting the baseline data incorporated all relevant disciplines. The baseline data of the project area was acquired, using the following methods:

- Literature/Desktop Research.
- Field Observation.
- Sampling and Measurements.
- Laboratory analysis of samples collected in the field.

The methods used for the acquisition of data are described in detail at the beginning of each study parameter.

Field Sampling and Observation

Field samplings and observations were carried out to cover relevant aspects of the baseline data acquisition. This was aimed at determining the ecological characteristics of the project area. JRB Oil & Gas Limited field sampling was conducted for only one season. The data gathering exercise was conducted between 5th and 6th February 2026. Visual observations were made and documented in the field notebook.

Photographs of important features were taken with **Samsung Galaxy Tab** digital camera. The neighborhood in which the petrol station is located was studied to obtain baseline environmental data.

Analytical Methodology/Quality Assurance

The quality assurance procedure and standard used in this EIA are those acceptable to ISO, WHO, FMENV and NMDPRA, and it covers all facet of the work which include; sample collection, handling and laboratory analysis, data coding and manipulation, statistical analyses, presentation and communication of results. A sample chain custody form was used for the registration and tracking of samples from the field to the laboratory.

Air, soil and water sampling were conducted in line with international scientific guideline and standard. The quality control for laboratory analysis is in accordance with standard recommended method and includes blank analyses to establish analytic level, duplicate analyses to establish analytical precision, spiked and blank samples analyses to determine analytical accuracy.

Sampling Points Geo-referencing.

The coordinates of the proposed site were determined using *Garmin 60GPSmap Versatile Navigator.* Samples of soil and portable water were collected around the proposed project site and taken to AEPB Lab at Asokoro for analysis while onsite air quality and noise level measurement were carried within and around the proposed project site. Encarta map and GPS were used in identifying the project site and sampling location.

At the project site, considering the technical layout we identified the various components of the project and proposed mitigation/corrective measures.

- Google map and GPS were used for the project site location and sampling locations with respect to grids.
- During the study, we sketch the existing adjoining land-use properties which help in determining the suitability of the proposed project in the area.
- Total of Ten (10) soil samples in five (5) locations were taken within and around the proposed project site for the assessment and control. Three of the samples were collected from within the proposed project site as test samples while two were collected from the up and down stream of the proposed project site as control samples. These samples were taken by the use of soil augur 0-15cm for surface samples and 15-30meters for subsurface samples and wrap in foil paper.

- Water sample was collected from a borehole within the proposed project site for ground water. No sample of surface water conducted as there is none nearby to site. These samples were collected with 1-2-liter dark amber glass/plastic bottles to check physio-chemistry. In-situ measurement of some unstable parameters of water sample such as pH, conductivity, Total Dissolve Solids, and temperature was also carried out. The level of ground water table and direction of flow were determined.

- Both water and soil samples were preserved in a plastic container (cooler) in the field and later transported to the lab and refrigerated at 4^0C.

- Ambient air quality parameters (So_x, No_x, Co particulates etc) were measured in-situ using air quality analyzer. The air quality was measured in Ten Sampling points within and around the proposed project site with two other locations outside the proposed project site as control taking into consideration areas of vulnerable receptors.

- Soil, water and air samples were collected in line with standard scientific guideline while the quality control for laboratory analysis was in accordance with recommended standard methods and include duplicate analyses to establish precision, spikes and blank samples to determine analytical accuracy. In-situ measurement of some unstable physio-chemical parameters like pH, conductivity, TDS and Temperature were carried out so as to ensure reliability and accuracy of the analysis.

- Data on the following parameters: climate, temperature, relative humidity, wind direction and wind speed were collected and examine through literature review.

Climate

Abuja under Köppen climate classification features a tropical wet and dry climate (Köppen: *Aw*). The FCT experiences three weather conditions annually. This includes a warm, humid rainy season and a blistering dry season. In between the two, there is a brief interlude of harmattan occasioned by the northeast trade wind, with the main feature of dust haze and dryness.

The rainy season begins from April and ends in October, when daytime temperatures reach 28 °C (82.4 °F) to 30 °C (86.0 °F) and nighttime lows hover around 22 °C (71.6 °F) to 23 °C (73.4 °F). In the dry season, daytime temperatures can soar as high as 40 °C (104.0 °F) and nighttime temperatures can dip to 12 °C (53.6 °F). Even the chilliest nights can be followed by daytime temperatures well above 30 °C (86.0 °F). The high altitudes and undulating terrain of the FCT act as a moderating influence on the weather of the territory. Rainfall in the FCT reflects the territory's location on the windward side of the Jos Plateau and the zone of rising air masses with the city receiving frequent rainfall during the rainy season from April to October every year.

Vegetation

The FCT falls within the Guinean forest-savanna mosaic zone of the West African sub-region. Patches of rain forest, however, occur in the Gwagwa plains, especially in the rugged terrain to the southeastern parts of the territory, where a landscape of gullies and rough terrain is found. These areas of the Federal Capital Territory (FCT) form one of the few surviving occurrences of the mature forest vegetation in Nigeria.

Soil

The soils of the territory are generally shallow and sandy in nature, especially on the major plains such as lku Gurara, Robos, and Rubochi. The high sand content particularly makes the soils to be highly erodible. The shallow depths reflect the presence of stony lower horizons. Those on the famous Gwagwa plains are however deep and clayey, perhaps reflecting the influence of parent materials like gabbro and fine to medium textured biotite granite.

Soil Quality

The pH is simply an expression of the concentration of hydrogen ions and most commonly measured parameter of soil characteristics. The pH measurements indicate the acidity, neutrality or alkalinity of a particular soil sample which gives useful information about the availability of exchangeable cations e.g. Ca^{2+}, Mg^{2+}, K^{+}

From the analysed samples, the following values were obtained, thus:

The pH of soil samples from the study area as analysed ranges between 5.85 to 6.82.

The Electrical Conductivity of the soil samples ranged between 105 to 163µS/cm. They are within the tolerable limit of electrical conductivity for normal plant growth.

Oil & grease was below detectable limit in all the analysed samples.

The most important plant nutrient cations in soils are Phosphate, Sulphate, Chloride and Nitrates. Soils with more than 15% of cation exchange sites occupied by Na^+ are unfavorable for plant growth (Donahue, et al 1990). The values of sulphate, nitrate and chloride ranges as follows: Sulphate (32.53-46.60mg/kg); Nitrate (10.50-12.20mg/kg) and chloride (2.14-4.20mg/kg) respectively.

Heavy metals such as Manganese, copper, iron, zinc, cadmium, lead analysed and the values recorded are: Manganese-Mn (1.057-1.351mg/kg); Copper-Cu 2.502-3.491mg/kg); Iron-Fe (4.023-4.202mg/kg); Zinc (0.245-1.153mg/kg); Cadmiu-Cd (0.017-0.025mg/kg); Lead-Ld (0.003-0.009mg/kg); while Nickel-Ni (0.002-0.015) respectively.

The result of the analysis of basic soil parameters considered indicates that the analytical values are all within the acceptable limits.

Ground water Characteristics

Ground water sample was collected from a borehole within the proposed project site. It was gathered that the ground water level is usually between 5-10 meters deep at the peak of the rainy season and between 15-20 meters deep in the dry season. At the time of the assessment, the ground water level was 16 meters deep.

pH: The pH value recorded is 6.99 which shows that the ground water sample is neutral and normal.

Temperature: The temperature value for groundwater in the area is within normal with temperature of 30.4^0C;

The conductivity recorded is 106.0µs/cm.

TDS: Total dissolved solids (TDS) value recorded is 53.0mg/l.

TSS: Total Suspended Solids (TSS) for ground water is 0.010mg/l against the 10mg/l FME limits. However,

Oil & Grease: Oil/grease was not detected in the ground water.

Groundwater Heavy Metals

The heavy metal concentrations in ground water sample are generally low and within limit. Among the heavy metals analysed in ground water; Manganese (Mn) Iron (Fe), Copper (Cu), Cadmium (Cd), Zinc (Zn), Lead (Ld), and Nickel (Ni) were analysed have concentrations of Mn: 0.077mg/l; Fe: 0.318mg/l; Cu: 0.002mg/l; Zn: 0.064mg/l; Ld, Cd, Ni and Cr were not detected respectively.

Groundwater Microbiology

The microbiological characteristics of the ground water sources in the study are presented in table 4.8. The Total Coliform Count CFU/100ml is 2.7; ESCHERICHIO COLI (CFU/100ml is $19x10^2$ CFU/100ml; Solmonello (CFU/ml and Shigello (CFU/ml where absent while Entric (CFU/100ml was $3.3x10^2$ respectively.

Air and Noise Quality

Ambient air quality parameters (SOx, NOx, COx, etc.) were measured in-situ using Handheld Digital Gas Monitor (Crowcon). Ambient noise levels were measured using 4-in-1 Environment Meter while HAZZ Dust meter was used for measuring Total Suspended Particulates (TSP).

NO_2 was detected in three sampling points with value of 0.01ppm which shows clean air in the area considering the allowable limit of 0.04-0.06 set by FMEnv for Nigerian environment.

Sulphur dioxide is subject to a series of transformation processes in the atmosphere, which can result in, sulphurous and sulphuric acids, sulphites and sulphates being formed. SO_2 was detected with values between 0.01-0.02ppm.

CO was detected in five locations with values recorded 01 and 02ppm, an indication of the environment being free of pollutant to be compared with the 11.4ppm maximum limit of FMEnv.

Ammonia (NH_3) was not detected in all the sampling points.
Hydrogen Sulfide was not detected in all the air monitoring points.
VOCs was not detected in all the sampling points.

Humidity Hair Hygrometer with a range of 0 – 100% was used in measuring the humidity. The relative humidity measured is between 40.0 to 40.5%.

Temperature

The prevailing temperature was measured with a 4-in-1 environment meter with a range of 0 – 100^{O}C. The ambient temperature of the proposed project site area was between 30.0 and 33.8^{0}C.

Total Suspended Particulates Matter

Minimum exposure limit for particulate matter according to the Nigerian standard is 250 µg/m^3. Total Suspended particulate is between 27.0 to 35.0 µg/m^3 for PM 2.5 and 86.0 to 97.0 µg/m^3 for PM 10, these values are far below the 250ug/m^3 maximum limit.

Noise

Noise is a collection of sounds in an environment in relation to its psychological effect on the receptors. Unpleasant sound can also be referred to as noise. Noise generation and reception vary from place to place. Average noise level recorded is between 40.0 to 63.4dB(A). These values are within the maximum limit of 90dB. All results are in µg/m^3 except otherwise stated. ND= Not Detected.

Summary of Contributions, Suggestions and Concern Made by Respondents

The contributions made during consultation with stakeholders of the neighborhood of the proposed project site was summarized, thus:

- The community is in support of the proposed JRB Oil & Gas Limited petrol station in the area and will cooperate with the proponent as the filling station commence development.
- The petrol filling station will enhance the security of the area.
- The community suggested that the proponent who is a key player in the petroleum industry and the NMDPRA who is the regulatory agency, should work together in ensuring the safety of the project, the community and the environment in general.
- The welfare and comfort of the community and neighbors should be considered seriously by the developer.
- The environment and public health should be protected from degradation.

- Some of the respondents' express fears of accidents or disaster that may cause fire outbreak. They require that adequate safety measures should be put in place to avoid injury on the neighborhood.
- The residents raised concern on the manner in which workers are recruited into the company. They said that nepotism should not play a major role in the recruiting process, noting that will shut out most residents. They proposed that open and competitive recruiting procedure to be followed and that the local residents to be given first priority. They noted that they need to benefit from the petrol filling station through being employed in the services of the company as opposed to a scenario where people from outside the neighborhood who may come to benefit.
- Company management to roll out an elaborate social responsibility projects (major concern of the neighborhood is access to good drinking water) so as the company to give back to society part of the profits that they are making from the same community they are operating in. In this manner, the wider respondents in the community will directly benefit from the company in a better and sustainable manner.
- Workers who will be engage to work in the petrol filling station need to be protected against injuries, high noise and dust inhalation. Management to ensure that the systems are put in place to ensure the working environment is not dusty and noisy and appropriate PPE are provided to all workers and that the workers are trained on how to make use of the PPE for their own safety.
- Some respondents are of the opinion that during the project operation, the marketer should be consistent in selling, no hording for the purpose of black-marketing business or connive with those engages in black market business.
- The petrol filling station in the area has ease accessibility to petroleum products to the neighborhood, and hence a welcome development.
- The respondents are unanimously in support of the proposed petrol filling station project in the area with as a project with unquantifiable positive impacts.

- The only advice made was for the proponent who is the key player in the petroleum industry, should develop the site in such a way that safety of people in the area is considered.

ES 5: Potential Environmental Impacts

A. Positive Impacts

- Employment creation
- Improvement on local economy
- Aesthetics Value
- Attractive Investment Destination

B. Negative Impacts

- Site Preparation and Construction
- Vegetation Loss
- Impact on Flora and Fauna
- Impact on Microbiological Organisms
- Drainage Alteration
- Impact on Traffic Flow and Road Safety
- Solid Waste Generation
- Impact on Water Resources Pollution
- Fugitive air emission
- Increase Noise level
- Population Increase

Operational Phase

Increased Traffic
Noise Pollution
Fire Hazards
Petroleum Products and Associated Health Safety Hazards
Potential for Liquid petroleum products explosion
Spillages and Leakages
Micro Climate Modification
Storm-water Management
Solid Waste
Sewage Management
Impact on Water Resources

Decommission

Air Quality
Waste Generation

Socio Economy
Waste Generation and Management
Environmental Pollution

ES 6: Recommended Mitigation Measures

The proposed project is generally a positive development in terms of economic progress in the petroleum sector. However, while the beneficial aspects are quickly realized, negative impacts from the development should also be appreciated and necessary measures incorporated in the project design, construction and eventually throughout its operation. The duty of achieving this, therefore, lies with proponent, the Project Design Architects and Engineers, the Contractor as well as the Operators and their Supervisors upon commissioning.

In view of the above, it is suggested that;

- Appropriate environmental, health and safety guidelines are developed at the initial planning stages of the project to guide the entire project implementation process,
- Other ongoing activities at and around the site be evaluated with respect to the environment, health and safety with a view to incorporating the proposed project and improvement of the related infrastructure,
- The project implementation does not cause unnecessary disruption to public utilities (e.g. water supply, power supply, waste water treatment systems, water resources, road network, etc.) and other land users in the area,
- That safety and security of the surrounding communities will not be compromised,
- Necessary technological considerations are considered to provide an acceptable waste quality and disposal procedures to safe guard natural resources such as people's health and ground water sources,

Below are specific mitigation measures recommended for the significant environmental aspects?

6.1 Planning Design and Construction

Planning

While planning for this development it will be necessary to consider the following basic aspects (some already addressed in the project document) of environment;

- The health of the workers and the neighboring communities is of key importance and necessary mechanisms should be provided for this purpose at the project planning phase (see health and safety below),
- Safety for on-site installations and people as well as those in the neighboring communities should also be considered in the project plans. This includes fire safety measures (see health and safety below),

Design

The layout and operation of the proposed petrol station is expected to;

- ❖ Integrate within the existing environmental infrastructure at site to facilitate sharing of services and amenities (e.g. power, water, solid refuse collection and roads), safety arrangements and waste management systems among others. This has already been catered as per the proposed project designs.
- ❖ Minimize risks to health and impacts to external environment. Suitable anti-pollution facilities (solid waste containment and organized removals, waste water purification) should be part of the design. This has been incorporated in the preliminary designs
- ❖ Consider changing environmental practices, market demands and availability of technology for flexibility on alternatives that do not have significant effects to the environment.

Construction

Though the construction phase will normally involve mobilization of construction materials, excavations and earth moving, effects from the proposed site are not expected to be significant in the neighboring areas. However, to mitigate any impacts to the surrounding communities, the construction equipment requires to be maintained at the best possible mechanical conditions to minimize aerial emissions (carbon dioxide, hydrocarbons, particulate matter etc.). The contractor will also therefore be expected to advise materials delivery trucks to observe utmost care on road safety, define specific safe roads to be used and maintain trucks in good condition to reduce exhaust emissions.

Common construction materials are generally harmless to the natural environment, but related debris could become an aesthetic nuisance. All wastes emanating from the construction activities are expected to be disposed of into designated grounds by the Council Authorities. Such debris includes excavated soils, concrete wastes, building blocks, packaging materials and

timber wastes.

Dust is one major environmental problem expected from construction sites. In order to reduce dust from the site, delivery trucks will always be covered, while the open stocks of sand and ballast will be constantly sprinkled with water to keep it moist. Care will be taken at all times when handling cement to minimize cement dust. In this connection, construction workers will be expected to be provided with personal protective equipment (dust masks, gloves, overalls/dust coats, boots and helmets) while at the construction site. Application of the same will be enforced.

The excavation of underground tanks pits should be such that the tanks should not be less than seventy centimeters below ground level when it is set to its final position. The tanks should rest upon and be trapped to a concrete raft and must be of sufficient weight to overcome tank buoyancy.

Document (photography or imagery) stages of construction as evidence of compliance with mitigation measures and approved plan particularly as regards to specified standards of structures such as the concreting of the floor and sides underground tank pits and that of the station.

All construction work on the project site should be done in the presence of an assigned NMDPRA inspector.

As part of project post-commissioning monitoring the management of the petrol filling station shall submit to the Director of Petroleum Resources, twice a year during the site preparation and construction phases and on annual basis for a minimum of five (5) years after the project/activity/action completion phase.

Gaseous wastes: The gaseous wastes will be in construction phases.

- Incoming vehicles during off-loading of building material e.g cement, sand
- Automobile exhaust may bring in fumes which are hazardous to health when absorb in the body.
- Odours: These may arise during construction phase due oil spillages and liquid wastes from vehicles coming in and out of the proposed site.
- The contractors to sparkle water on the soil and sand to reduce dust emissions.

6.2 Operations and Maintenance

1. Waste Generation

The Station in its day-to-day operations will generate various classes of waste, which include solid, liquid and gaseous wastes.

Solid Waste: Solid waste which might be generated at the site includes plastics, sand, cement, timber, steel, glasses, paper, debris, empty oil cans, rags, as well as empty water bottles. Others include biodegradable and non-biodegradable papers. This waste should be collected and put in a disposal point.

Liquid Wastes: There are two groups of liquid wastes which might be generated from the Station. The first groups of liquid are those, which result from the use of toilets. These wastes once generated should be directed into main sewer line managed by Abuja Municipal Waste Management Contractors. The second category of liquids is that which might be generated from cleaning of the operation site as well as run-off resulting during rainy days. This waste carries silt, sediment oil and grease.

The proposed station management will put in place used oil waste collection point and a clear mode of waste management generated from cleaning of the operation site, as well as run-off resulting during rainy days. The oil interceptors will be put in place and periodic analysis will be carried out to ensure no contamination occur as a result of the station's activities. Also, all the drainage shall be covered with appropriate materials e.g. metal grills or concrete slabs.

Storm drains and waste water collection systems including sewers and open drains should be clearly shown on the designs. Monitoring points should also be fitted on the drains/sewers, for this reason, specific design provisions should include;

i. Solid wastes (including garbage, papers, plastics and packaging materials, fats/oils) will be generated. The design should therefore, provide for suitable solid waste collection receptacles at strategic locations at the premises. An accessible area with a concrete slab should also be provided for collection and storage of the various solid waste categories awaiting disposal.
ii. Surface run-off from open surfaces should NOT mix with the waste water. In this regard, storm water drains should be provided to pass at safe to the municipal drainage system
iii. All the discharged points of oily waste water, solid wastes and spent lubricants should be registered with the DPR. This will help in constant monitoring of waste generated and the limit of disposal into surface water from the station.

Potential Mitigation Measures

- Maintenance of drainage channels and oil interceptor tanks.
- Spent lubricant should be differentially from other oily effluents and channeled into a source recovery system or into a receptacle approved by the NMDPRA.
- Discourage or avoid disposal of oil contaminated water on the ground
- Covering the whole operation area with concrete hardstand
- There should be adequate provision for the road side drainage line so as to ensure free and continues flow of the line to avert any potential flooding of immediate neighborhood.

Gaseous Wastes

- The vehicles will be coming in and out and this may bring about dust.
- Emissions arise from automobiles and service/ delivery trucks
- Sweeping the surface on the site generates additional dust.
- Odours may be experienced in operational phase. Bad smells may arise from spillages and liquid wastes that are not cleaned up and uncollected trash that may accumulate on the site, including used oils, and used rags from cleaning works.
- Fumes originating from petrol tank and during refueling as well as emissions from motor vehicle exhaust systems.
- Air Pollutants from Incomplete Petrol Combustion may bring about contamination of air which may affect the animals and plants.

Potential Mitigation Measures

To minimize air emissions, the following measures are suggested:

- During operational phase, keep the forecourt clean; it should be regularly sprinkled with water to minimize dusts generated by traffic i.e. always suppress dust by water-spraying before sweeping.
- To avoid bad smells, spillages should be immediately cleaned up. An appropriately designed container for waste collection should be provided on the site for temporarily storage of uncollected trash. Prompt disposal of such material should be done.
- Avoid open-air incineration of trash near the station.
- To avoid fumes, smoke and volatile hydrocarbons, the generators should be properly maintained while the pumps nozzles should be well fitted into the vehicles tanks to prevent escape of hydrocarbons.

2. Oil Spills and Leaks

Surface spills and leaks are likely to happen during fueling and tank filling activities thus increasing risks of fire and ground contamination. The station drainage plan should ensure that all spillage arising from the forecourt operations are well managed.

Potential mitigation Measures

- Additional measures to contain spillages such as oil-retention brooms be set up on the facility;
- Ensure leak-detection mechanisms are incorporated on the UST and piping;
- Develop a spill prevention and control plan to counter and manage emergencies that may arise in the event of accidental spillages.
- All spent oil must be stored in 200liter drums and disposed appropriately and any oil spill over 200 liters should be considered as an emergency. These and other similar measures stated above are aimed at forestalling underground water and soil pollution of the area.
- The proponent should draw up contingency plan prior to the commencement of facility operation and provide resources for prevention and timely response to spills. In case of oil spill, the proponent should clean up all hydrocarbons and chemical spills emanating from the company's operations in a timely and efficient manner. Details about the spillage/leakage must be reported within 14 days of the spill on the oil spillage/leakage report form. The oil spillage response/clean up report must be submitted within four (4) weeks.
- A borehole or well should be provided within the project site and should be properly maintained, this will be used for monitoring of early warning/detection of underground tanks leakages.

3. Material Storage and Handling

Other than Class A and B fuel products, which are stored underground, there are other retailed products including engine oils and lubricants, which are stored in a section of the sales office.

Potential Mitigation Measures

- The store should be reorganized such that materials of similar nature, use and properties are stored separately from other types and each section clearly labeled.
- The capacity of any individual underground storage tank shall not exceed forty-five thousand liters (45,000 liters) (EGASPIN Part VII B, sect. 4.2.1 (vi).

4. Fire and Explosion Hazards

The proposed station has indicated intentions to installed fire control measures for use in case of an emergency; this is together with fire assembly point which will be clearly marked. There is need to fully comply with existing regulations. However, there is still room for improvement as this is a very sensitive operation as far as fire is concerned.

Potential Mitigation Measures

The following measures are recommended:

- Need to have sufficient powder fire extinguishers conveniently located near each fuel dispenser, in store and serviced after every six months;
- Designing and clearly displaying the fire emergency response plan on the walls of the station
- Provide appropriate training to the staff on fire emergency procedures
- Provide warning signs such as "No Smoking", "Highly Inflammable", "Switch Off Your Car Engine" and "No GSM Calls".
- Install one water hydrant
- Put sand buckets at every location
- Sources of naked flame from cooking should be avoided in the filling station.
- Training should focus on basic management of possible disaster situations such as fire disaster or explosion as well as on prevention.
- Construct a fence with masonry wall made from concrete or embankment with a height of not less than 1.5m, in order to prevent access to unauthorized persons and serve as fire outbreak.

5. Environmental Health and Safety Management

Occupational health is a major consideration in the facility due to the nature of the products and derivative wastes. These include the highly flammable liquid fuels and toxic used oils amongst others. Used oils are also toxic and must be handled with care and provision of protective clothing.

The following issues should be noted:

- Ensure all the workers have personal protective equipment
- The first-aid box to be provided,
- Hazardous materials to be stored separately from the rest, with appropriate hazard warning signs posted on at their location
- Good housekeeping practices to minimize incidents.
- Use proper techniques for removal of spilled toxic materials.
- Develop a health and safety plan for the facility

- Employ the services of a consultant who will be responsible for coordinating Environmental Health e.g. air pollution control, water pollution control, solid and hazardous waste management etc. in the station.
- Develop a contingency plan to guide the operation of the station.

6. Land, Soil Quality and Aesthetic

a) Land and soil quality

- The facility has insignificant impact on land quality though during operational phase proper care and handling of petroleum products will be important to ensure no soil contamination within the site and its immediate environment.

b) Aesthetics and landscaping

The proposed site is to be constructed on a land that is currently with grassland and maize crop. There is need for the proponent to embark on ground landscaping during operational phase.

7. Traffic

An effective traffic control management must be ensured by the management for the control of vehicular traffic in and out of the station during construction and operation. It should be boldly written on a sign
post at least 250 meters away 'SLOW DOWN YOU ARE APPROACHING'''A CONSTRUCTION SITE'' (during construction) and ''FILLING STATION'' (during operation) along the major road. Other signs such as 'NO PARKING'''KEEP MOVING''.

6.3 Socio Economics

The neighborhood should be considered for unskilled labour, such as laborers and security guards.

As part of the company's corporate social responsibility, the proponent should always liaise with the neighborhood for any assistant especially in the provision of good portable water supply, access roads and school/health care facilities.

6.4 Decommissioning

Description of the project's decommissioning activities

Demolition works: Upon decommissioning, the project components such as buildings, pavements, drainage systems, parking areas and perimeter

fence will be demolished.

The wastes generated from demolition activities should be reused or if not reusable, disposed of appropriately by a licensed waste disposal company. The wastes should be reused or if not reusable, disposed of appropriately by a licensed waste disposal company.

Dismantling of equipment and fixtures

All equipment including electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of this equipment in other projects. This will be achieved through auctioning of the equipment to other contractors or reused in another site.

Site restoration: Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

ES 7: Environmental Management Plan (Post-EIA Monitoring)

The method for monitoring of project operation will be as follows:

- Accredited independent consultants engaged by the facility managers must conduct monitoring.
- Monitoring report to be prepared and submitted to the regulatory agencies for review, comments and approval as the case may be ensuring the adoption of standard procedure in data collection and analysis as well as impact assessment and recommendation of appropriate technology.
- As part of project post-commissioning monitoring the management of the petrol filling station shall submit to the NMDPRA, twice a year during the site preparation and construction phases and on annual basis for a minimum of five (5) years after the project/activity/action completion phase.

ES 8: Conclusion

Although the facility has a few shortcomings that may potentially impact negatively on the environment to a certain extent in the long run, strict compliance to the recommended mitigation measures and environmental management plan will undoubtedly forestall any potential environmental impacts at this stage of facility's operation.

Acknowledgement

JRB Oil & Gas Limited wishes to express her profound appreciation to Geofteda Ventures Nigeria Ltd. (EIA Consultants) for its commitment towards the success of the EIA study.

We also appreciate the support and cooperation of the Federal Ministry of Environment (FMEnv) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) and other stakeholders for their valuable contributions towards the success of this project.

CHAPTER ONE

1.0 Introduction

This report presents the findings of environmental Impact Assessment (EIA) on the proposed site for JRB Oil & Gas Limited petrol filling station, located at Plot No. 186 Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT. The Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA), as part of its permitting process requires projects of this nature to conduct an Environmental Impact Assessment (EIA) of the proposed development. The NMDPRA visits the proposed project site to a certain its suitability as per the requirement stipulated in its Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN, 2018), before the EIA is conducted. See Appendix 1, for NMDPRA site suitability approval letter.

Geofteda Ventures Nig. Ltd. an accredited consultant with the Federal Ministry of Environment (FMEnv), Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA), National Environmental Standards Regulations & Enforcement Agency (NESREA) and Abuja Environmental Protection Board (AEPB) has been appointed *by JRB Oil & Gas Limited* to conduct the Environmental Impact Assessment of the proposed site for the petrol service station in line with the EIA Act CAP E12 LFN 2004 and the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN, 2018). The study is also in consonance with the corporate policy of New Brand Petroleum Ltd on environmental protection.

1.1 The Proponent

JRB Oil & Gas Limited (JRB) is an emerging company with interest in venturing in the oil and gas business through distribution and retailing of petroleum products. The company is incorporated under the Companies and Allied Matters Act, 1990 as a private company limited by shares dated 29th, November, 2012. One of the major objectives of the company is the business of selling and distribution of petroleum products (PMS, AGO, DKP, LNG & LPG inclusive).

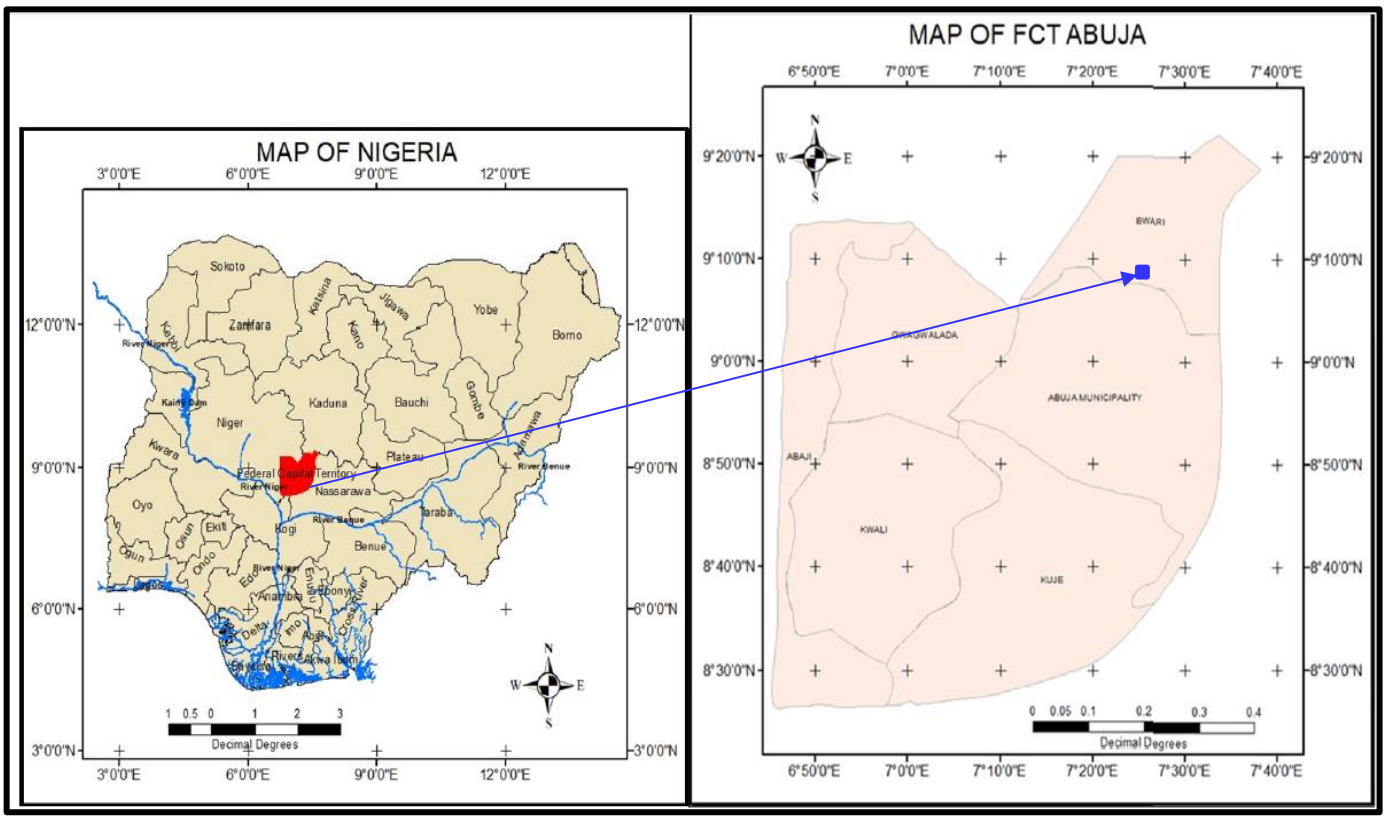
1.2 Proponent Intend

The proponent (**JRB Oil & Gas Limited**) intends to construct a petrol filling station with combined capacity of Three hundred and fifteen thousand (315,000 liters) liters storage and dispensing facilities. Other structures

planned at the site include the station administrative/sales building, a separate building to house power generating plant and canopies over the pumps island. Initial construction activities include excavation of the soil for burying of storage tanks and for installation and lying of pipes.

1.3 Proposed Project Location

The proposed project is located at Plot No. 186, Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT. The GPS location at the center of the site is between Latitude 9° 7'7.01"N and Longitude 7°27'8.20"E on elevation of 979.9 meters above sea level on an area of 7,186.68m^2.



Legend:	FCT Abuja	Bwari Area Council

Figure 1.1 Map of Nigeria showing Abuja and the Proposed Project Site

Figure 1.2 Safelite Map of Katampe Showing the Proposed Project Site

Plate 1.3: Project Site Pictorial View

1.4 Project Screening

As earlier highlighted in chapter one, even though the project for which this EIA is being prepared falls under category II (mini projects) of the EIA Decree No.86 of 1992 and require an EIA in accordance with the provisions of the Town and Planning Decree of 1992, the extent of the screening and scoping process is by and large limited to a few basic environmental parameters by virtue of its official categorization. Screening process involves the use of matrix and Batelle techniques respectively for the identification of potential adverse environmental impacts that are likely to be encountered from the project's chain of activities during the various implementation stages right from site clearance and preparation through to project construction, operation, and possible abandonment. The technique adopted would allow project proponent to compare different project alternatives and select the most viable option. The technique(s) will also lay down both negative and positive impacts of the project and from these perspective projects or alternatives with the least negatives environmental impacts will be favored. This thorough screening is only applicable in full blown EIA.

1.5 Purpose of EIA

According to Part 1, "General Principles of Environmental Impact Assessment," of Act 86 promulgated in 1992, the objectives of any environmental impact assessment shall be:

- To establish before a decision taken by any person, authority, corporate body or unincorporated body including the Government of the Federation, State or Local Government intending to undertake or authorize the undertaking of any activity that may likely or to a significant extent affect the environment or have environmental effects on those activities shall first be taken into account;
- To promote the implementation of appropriate policy in all Federal Lands (however acquired) States and Local Government Areas, consistent with all laws and decision-making processes through which the goal and objective in paragraph (a) of this section may be realized;
- To exchange the development of procedures for information exchange, notification and consultation between organs and persons when proposed activities are likely to have significant environmental effects on boundary or trans-state or on the environment of bordering towns or villages.

Thus, EIA process is to:

1) support the goals of environmental protection, through minimizing environmental impacts and sustainable development;
2) integrate environmental protection and economic decisions at the earliest stages of the proposed project;
3) predict environmental, social, economic, and cultural consequences of a proposed activity and assess plans to mitigate any adverse impacts resulting from the proposed activity; and
4) provide for the involvement of the stakeholders in the review of the proposed activities.

The key results of an EIA process will be the findings and recommendations that will be translated into specific environmental management actions. The EIA will also be used as basis for communication to achieve productive interaction between relevant stakeholders, with reference to the issues identified during the course of the study.

As would be further discussed in this chapter, EIA is compulsory for all projects of this nature. According to section 2 of Part 1, "General Principles of Environmental Impact Assessment," of the Environmental Impact Assessment EIA CAP E12 LFN 2004.

- The public or private sector of the economy shall not undertake or embark or authorize projects or activities without prior consideration, at an early stage of their environmental effects.
- Where the extent, nature or location of a proposed project or activity is such that is likely to significantly affect the environment, its environmental impact assessment shall be undertaken in accordance with the provisions of this Act.

The main objectives of the EIA of the proposed project
are to:

- Obtain and provide all necessary data/information that would satisfy all stakeholders (Federal, State and LGA) as objective evidence required for developing the EIA for the proposed project;
- Identify the environmental regulations that will affect the proposed Petrol Station project;
- Establish the baseline conditions of the project location thereby identifying the resources (including social) that might be affected by

actions associated with the proposed project;

- Understand the proposed project facilities and activities thereby identifying the potential and associated effects of, and hazards posed by, the pursuit of the project;
- Recommend preventive, reduction and control measures for identified potential/associated adverse impacts of the project;
- Develop a cost effective EMP that recommends plans and procedures to manage the consequences and recover from exceptional events throughout the lifetime of the project;
- Provide the basis for consultation with regulatory authorities, the public and other stakeholders; and
- Support subsequent applications for associated environmental permits.

1.6 Terms of Reference (ToR) and Scope of Work

In line with the EIA Procedural Guidelines of 1995 and the Environmental Guidelines and Standards for the Petroleum Industries in Nigeria (EGASPIN) policy on all new proposed petrol filling stations with capacities of up to 180,000 liters or the site has some form of physical, social or environmental constraints that will need some form of mitigation measures. The project activities require that an EIA is carried out at the planning stages of the proposed project to ensure that significant impacts on the environment are taken into consideration in the design.

The ToR contained the following:

- Scope of work for the EIA including the overall data requirements on the proposed industrial park;
- Environmental regulations guiding the project;
- Methods and procedures for adequate ecological and socioeconomic data gathering, identification, prediction and evaluation of associated/potential impacts of the project as well as impact mitigation/control measures;
- Minimum requirements of an effective Social and Environmental Management Plan (SEMP); and
- Basis for interaction/consultation with regulatory authorities and other stakeholders.

The following general steps were followed during the assessment to ensure comprehensiveness and completeness of an EIA Report: -

- Environment screening in which the project was identified as among those requiring Environmental Impact Assessment together with some form of concise mitigations and Environmental Management Plan (EMP).
- Physical inspection of the site and its environs.
- Desktop studies, consultations, questionnaires and interviews with the proponent, his consultants and the neighborhood.

This project report provides relevant information and environmental considerations on the project proponent's intention to seek approval from NMDPRA for the project development.

1.7 Project Scoping

Project scoping is an integral part of an EIA procedure. It entails the undertaking of some specific studies and activities in accordance with the terms of reference. The result of such reconnaissance studies must be able to give a complete and an independent assessment of the potential impacts of the project in question on the environment. And the scope of such an assessment will not only be limited to environmental issues alone but must also consider other socio-economic and cultural aspects.

The level of project scoping depends on the size of the project, the degree of its environmental sensitivity areas and the proximity of the project site to sensitive environmental areas. Although the project in question is a small project covering only about 7,186.68m^2, it is important to examine it appropriately within the context of its immediate environment essentially because the collective storage capacity of the project on completion will be in the region of 315,000 liters of highly inflammable products.

The scope of this EIA study includes the following:

- A review of policy, legal and administrative framework.
- Description of the proposed project.
- Baseline information including biophysical and socio-economic environment and land use.
- Assessment of the potential environmental impacts on the project area.
- Development of the mitigation measures and future monitoring plans.
- Proposition of alternative sites & technologies.
- Occupational Health and Safety (OHS).
- Social and environmental management planning (including plans for

decommissioning, closure or abandonment); and

- Preparation of draft and final EIA reports following approved guidelines and procedures.

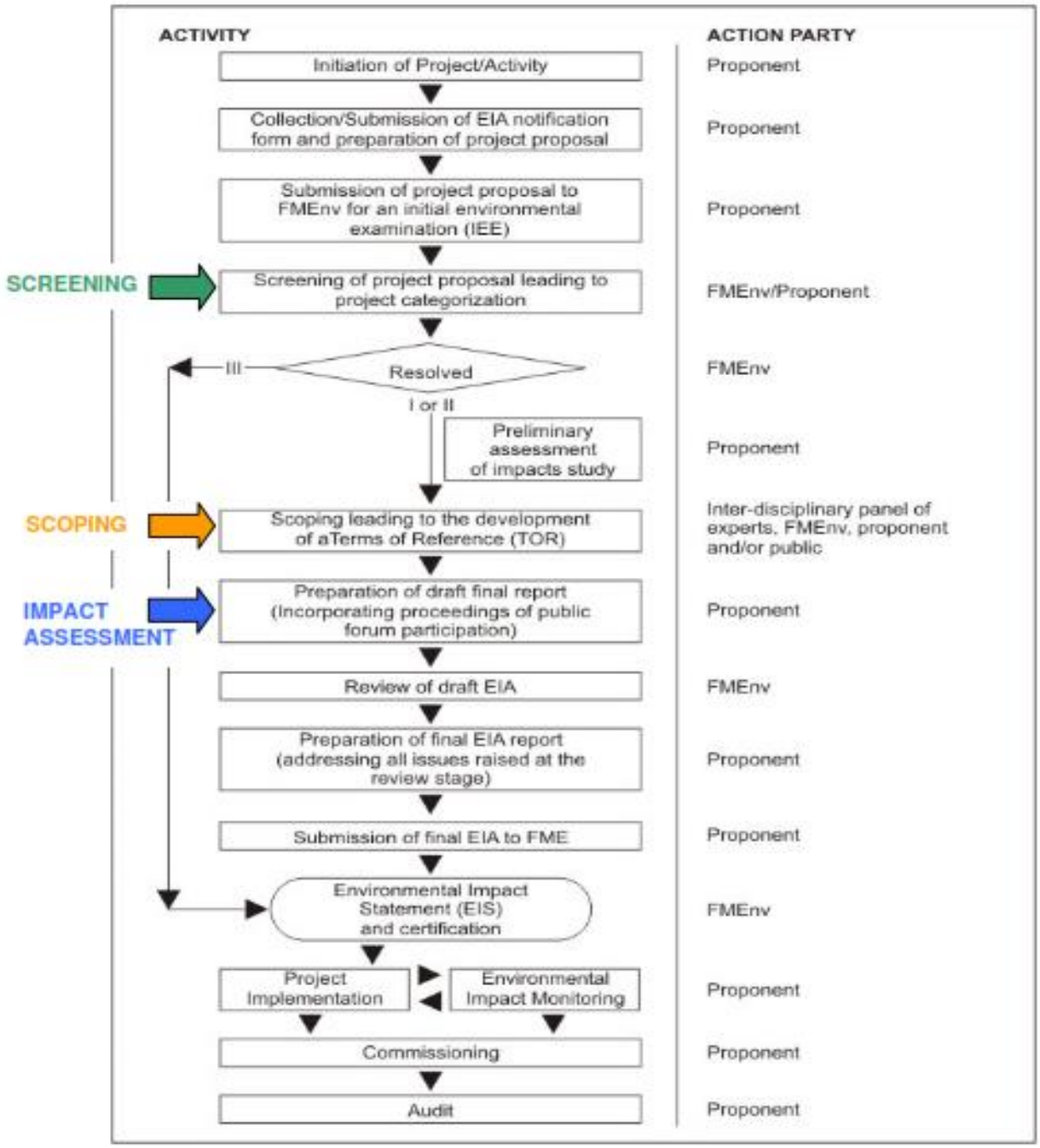


Figure 1.3 Flow Chart of EIA Process in Nigeria

1.8 Regulatory and Legal Framework

The Environmental Assessment compliance criteria used in the EIA was based on the following legal framework: -

National Policy on Environment

The National Policy on Environment was launched in 1989 by the Federal Government of Nigeria to achieve Sustainable Development in Nigeria and particularly to;

- Secure for all Nigerians a quality environment, adequate for their health and well-being.
- Restore, maintain and enhance the ecosystems and ecological process essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of their natural resources and ecosystem.
- Raise public awareness and promote understanding of essential linkages between environment and development and to encourage individual and community participation in environmental improvement efforts.
- Corporates in good faith with other countries, international organizations/agencies to achieve optimal use of trans-boundary natural resources and effective prevention or a statement of trans-boundary environmental pollution.

National Environmental Laws

A number of laws were passed for the conduct of environmental regulation in Nigeria e.g.

Environmental Impact Assessment EIA Act Cap E12 LFN, 2004

The EIA Act No. 86 of 1992, now codified as, EIA Act Cap E12 LFN, 2004, is the principal legislative instrument relating to activities that may affect the environment or, to a significant extent, affect the environment. The Act sets the goals and objectives of EIA and procedures, including the minimum requirements for EIA conduct of public or private projects. The Act makes ESIA mandatory for all major development projects likely to have adverse impacts on the environment and gives specific powers to FMEnv to facilitate the environmental assessment of projects in Nigeria. FMEnv categorises mandatory study activities into three:

Category 3 activities have beneficial impacts on the environment;

Category 2 activities, unless within an Environmentally Sensitive Area, full ESIA is not mandatory; while

Category 1 activities require full and compulsory EIA. Projects are pre-listed into these categories based on the type and whether they would involve

physical interference with the environment. Either the listing or the result of an Initial Environmental Evaluation (IEE) is used to determine projects requiring full EIA.

Land Use Act CAP L5 LFN 2004

The Land Use Act is the legal framework for land acquisition and resettlement in Nigeria. The Act stipulates that all land in Nigeria is to be held by State Governors in trust for the people. The administration of urban land is directly under the control and management of the Governor, whereas non-urban land is under the control and management of the Local Government Council.

By implication, the Governor has the right to grant statutory rights of occupancy to land while the Local government has the right to grant customary rights of occupancy. At any rate, all lands irrespective of the category belong to the State. At the same time, individuals only enjoy a right of occupancy as contained in the certificate of occupancy or where the grants are "deemed". Thus, the Land Use Act is the key legislation that directly relates to resettlement and compensation in Nigeria. The Act makes it lawful for the Governor to grant statutory rights of occupancy for all purposes, grant easements appurtenant to statutory rights of occupancy, and demand rent. The local government, under the Act, can enter, use and occupy for public purposes any land within its jurisdiction that does not fall within an area compulsorily acquired by the Government of the Federation or of relevant State; or subject to any laws relating to minerals or mineral oils.

In summary, the Acts gives the government the right to acquire land by revoking both statutory and customary occupancy rights for the overriding public interest. In doing so, however, the Act equally specifies that the State or Local Government should pay compensation to the current holder or occupier with equal value.

Federal Ministry of Environment

The concern to protect the environment and the provision of an adequate institutional arrangement to address this issue began in the days of the colonial government; with efforts such as prohibiting water pollution and inspection of homes by health inspectors. Post-independence era saw the first major bold step taken by the Federal Government to provide a statutory response to environmental issues when in 1975, a division of Urban and Environment was created in the Federal Ministry of Economic Development to handle among others, pollution and other industrial matters. The Federal Government of

Nigeria (FGN) by Act 58 of 1988 established the Federal Environmental Protection Agency (FEPA) to protect, restore and preserve the ecosystems of the nation. The Agency's authority was further strengthened when in January 1992 through Act 59; the FGN moved FEPA to the Presidency and expanded its mandate to include the protection of Nigeria's biodiversity and conservation of its natural resources by merging the National Resources Conservation Council with the Agency. With the creation of the Federal Ministry of Environment in June 1999, FEPA was absorbed and its functions taken over by the Ministry.

The Nigerian Urban and Regional Planning Act CAP N138 LFN 2004.

In Nigeria, urban and regional planning laws and regulations play a critical role in managing the challenges of rapid urbanization and ensuring sustainable development. These legal frameworks guide land use, infrastructure development, and environmental conservation.

Section 13 deals with the procedure for preparation of national physical development plans. While section 25 deals with the procedures of making regional sub regional plans, rural plans etc. and section 26 subject plans all these are tailored towards zoning and development.

The Petroleum ACT, CAP P10, LFN 2004

The Act to provide for the exploration of petroleum from the territorial waters and the continental shelf of Nigeria and to and to vest the ownership of and all on-shore and off-shore revenue from petroleum resources derivable therefore in the Federal Government and for all other matter incidental thereto. And subsequent regulations made pursuant to section 8 (1) b (iii) of the Act which empowers the Minister of Petroleum Resources to make regulations for the prevention of pollution of water courses and the atmosphere. This provided the legal framework for the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) to request from potential marketers an EIA report before approval to construct a new petrol filling station is granted. The conduct of the EIA should be in line with NMDPRA's Revised Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) of 2018 and The DPR Guidelines for Approval to Construct and Operate Petroleum Products Filling Station (2015).

National Environmental Impact Assessment Procedural and Sectoral Guidelines

In response to the promulgation of the EIA Act of 1992, the FMEnv developed a National EIA Procedure in 1995. The procedure provides steps to be followed from the stage of project conception to commissioning in order to ensure that the project is implemented with maximum consideration for the environment.

National Environnemental Protection (Effluent Limitation) Régulations 1991 IS.I.8

The National Environmental Protection (Effluent Limitation) Regulations, S.1.8 of 1991 (No.42, Vol.78, August,1991) make it mandatory for industries such as waste generating facilities to install anti-pollution and pollution abatement equipment on site. The Regulations are specific for each category of waste generating facility with respect to limitations of solid and liquid is charges or gaseous emissions into the environment. Appropriate penalties for contravention are also prescribed.

National Environmental Protection (Pollution Abatement in Industries Generating Wastes) Regulations 1991 IS.I.9

The National Environmental Protection (Pollution Abatement in Industries Generating Wastes) Regulations, S.1.9 of 1991(No.42,Vol.78, August, 1991) impose restrictions on the release of toxic substances and stipulate requirements for pollution monitoring units, machinery for combating pollution and contingency plan by industries; submission of lists and details of chemicals used by industries to FMEnv; requirement of permit by industries for the storage and transportation of harmful or toxic waste; the generator's liability; strategies for waste reduction; permissible limits of discharge into public drains; protection of workers and safety requirements; environmental audit (or EIA for new industries) and penalty for contravention.

National Environmental (Sanitation and Waste Control) Regulations, 2009 1S.I.28

The purpose of these Regulations is the adoption of sustainable and environment friendly practices in environmental sanitation and waste management to minimize pollution.

National Environment Protection (Management of Hazardous and Solid Wastes) Regulations 1991. (S.I.15)

The National Environment Protection (Management of Hazardous and Solid Wastes) Regulations, S.1.15 of 1991 (No.102, Vol.78, August, 1991) define the requirements for groundwater protection, surface impoundment, land treatment, waste piles, landfills, and incinerators. The Regulations describe the hazardous substances tracking programme with a comprehensive list of acutely hazardous chemical products and dangerous waste constituent. The requirements and procedure for inspection, enforcement and penalty are also described.

National Environmental Standards and Regulations Enforcement Agency

The National Environmental Standards and Regulations Enforcement Agency (NESREA) was established by the Federal Government of Nigeria as a parastatal of the FMEnv. The NESREA Act was signed on the 30th July 2007. The Agency is charged with the responsibility of enforcing all environmental laws, guidelines, policies, standards and regulations in Nigeria. It also has the responsibility to enforce compliance with provisions of international agreements, protocols, conventions and treaties on the environment. The regulations issued and enforced by NESREA relevant to the facility operations and its Area of Influence are:

- National Environmental (Construction Sector) Regulations, 2009
- National Environmental (Sanitation and Wastes Control) Regulations, 2009
- National Environmental (Noise Standards and Control) Regulations,
- 2009 National Environmental (Ozone Layer Protection) Regulations, 2009
- National Environmental (Soil Erosion and Flood Control) regulations
- 2011
- National Environmental (Surface water and Groundwater Quality Control) Regulations 2011
- National Environmental (Protection of Endangered Species in International Trade) Regulations, 2011.

An overview of these regulations is provided in Section 1.6.4. The facility will need to adhere to the requirements stipulated within these regulations throughout its operating life including decommissioning.

National Environmental (Noise Standards and Control) Regulations, 2009 (S.I.35)

The purpose of these Regulations is to ensure maintenance of a healthy environment for all people in Nigeria, the tranquility of their surroundings and their psychological well-being by regulating noise levels and generally, to elevate the standard of living of the people by-

prescribing the maximum permissible noise levels, a facility or activity to which a person may be exposed;

providing for the control of noise and for mitigating measures for the reduction of noise; and generally, for giving effect to the provisions of section 22 of the Act.

The regulations among others state the permissible noise levels to which a person may be exposed; control and mitigation of noise; permits for noise emissions in excess of permissible levels; and enforcement.

National Environmental (Noise Standards and Control Regulations. 2009 1S.I.35

This instrument prescribes the maximum permissible noise levels to which a person may be exposed; and provide for the control of noise and mitigating measures for the reduction of noise.

National Environmental (Soil Erosion and Flood Control Regulations. 2010 (S.I.12)

The overall objective of this regulation is to check all earth-disturbing activities, practices or developments for non-agricultural, commercial, industrial and residential purposes.

National Environmental (Control of Bush/Forest Fire and Open Burning) Regulations. 2010 (S.I.15)

The principal thrust of this regulation is to prevent and minimize the destruction of ecosystem through fire outbreak and burning of any material that may affect the health of the ecosystem through the emission of hazardous air pollutants.

National Environmental (Surface and Groundwater Quality Control) Regulations. 2010 (S.I.22)

The purpose of this regulation is to restore, enhance and preserve the physical, chemical and biological integrity of the nation's surface waters, and to maintain existing water uses.

Penal Code (Northern States) Federal provision Act Cap 345 LFN 1990

The Penal Code Act is the law concerning offenses and their punishment and it is applicable in the northern part of Nigeria. The Act was adopted on the 30th day of September 1960. The Penal Code Act contains a total of 25 Chapters and 410 sections. The Act contains a total of 12 Chapters, and about 67 Sections that criminalize certain acts as offences as applicable to the Northern States in Nigeria.

Endangered Species Act, CAP E9, LFN 2004

The endanger species Act (control of international trade and traffic) Cap 108 Law of Nigeria, 1990 prohibits the hunting, capturing and trade of endangered species. An Act to provide for the conservation and management of Nigeria's wildlife and the protection of some of her endangered species in danger of extinction as a result of over-exploitation, as required under certain international treaties which Nigeria is a signatory.

Occupational Safety and Health (Factories Act, Cap 126, 1990)

The Factories Act Cap 126, Laws of the Federation of Nigeria, 1990 is the legislation for the enforcement of safety health standards in Nigerian workplaces.

National Health Act, 2014

The aim of the Act is to establish a framework for the Regulation, Development and Management of a National Health System, to set standards for rendering health services in the Federation and other matters concerned therewith.

The Act was also enacted for purpose of providing healthcare insurance to certain class of people who are actually deprived.

The Acts seeks to help Nigeria reduce maternal and infant mortality rate by 2015. More pregnant women would have access to free delivery services while their children are assured of standard pediatric services in the nation’s health facilities.

National Building Code, 2006

The aim of this code is to set minimum standards on building pre-design, designs, construction and post-construction stages with a view to ensuring quality and proficiency in the building industry.

Employees Compensation Scheme (2010)

The employees Compensation Act 2010, establishes the Employees Compensation Scheme (ECS) to replace the workmen's Compensation Scheme in line with global best practices and trends. The ECS provided adequate and timely compensation for employees who suffer injuries/diseases in the course of their employment. In addition, it provides rehabilitation for injured employees in work places and replacement of loss of productivity to the employer. It is a no-fault claim scheme. The surplus fund generated from the scheme is being invested in other basic social security services.

National Oil Spill Detection and Response Agency (NOSDRA), 2006

NOSDRA was established in 2006 as an institutional framework to co-ordinate the implementation of the National Oil Spill Contingency Plan (NOSCP) for Nigeria in accordance with the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 90) to which Nigeria is a signatory. Since its establishment, the Agency has been ensuring compliance with environment legislation in the Nigerian Petroleum Sector.

Nigerian Oil and Gas Industry Content Development Act 2010

An Act to provide for the development of Nigerian content in the Nigerian oil and gas industry, Nigerian content plan, supervision, coordination, monitoring and implementation of Nigerian content; and for related matters.

Public Health Law CAP 103 LFN 1990

Public Health Law examines the authority of the government at various jurisdictional levels to improve the health of the general population within societal limits and norms. The State is empowered to protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria. The law prohibits the public or private sector of the economy not to undertake or embark on or authorize projects or activities without prior consideration of the effect on the environment.

Employee's Compensation Act, 2010

The Act provides for an open and fair system of guaranteed and adequate compensation for all employees or their dependents for any death, injury, disease or disability arising out of or in the course of employment. The Act also makes provision for rehabilitation of employees with work-related disabilities

and establishment of a solvent compensation fund managed in the interest of employees and employers. One of the core objectives of the Act is to harness combined efforts and resources of relevant stakeholders for the prevention of workplace disabilities and the enforcement of occupational safety and health standards in Nigeria. This act will be applicable to the construction and rehabilitation component of the program as labourers and other workers will be involved.

Harmful Wastes (Special Criminal Provisions etc.) Act CAP HI LFN 2004

An Act to prohibit the carrying, depositing and dumping of harmful waste on any land, territorial waters and matters relating thereto. Specifically, Section 1 of the Act prohibits all activities relating to the purchase, sale, importation, transit, transportation, deposit, storage of harmful wastes. Section 6 of the Act spells out the penalty for offences under the Act to include life imprisonment for individual and appropriate punishment for corporate bodies.

Trade Union (Amendment) Act 2005 Laws of The Federation of Nigeria)

The major objective of the Trade Union Amendment Act 2005 is the provision of democratization and liberalization of the unions and labour and also to guarantee the freedom of association of workers in Nigeria (LRN, 2005)

Abandonment Guidelines (FMEnv Abandonment Guidelines, 1995)

This **guideline** spells out the National statutory steps and **procedures** for the decommissioning.

Engineering codes and standards

Engineering codes and standards are sets of guidelines and rules that are used to ensure the safety, reliability and performance of engineered systems, such as fire and life safety, electrical systems and mechanical systems

Labour Act (Cap L1 LFN 2004)

The Labour Act, 2004, is the principal legislation governing employment relation in Nigeria. Its application extends to employees engaged under a contract of labour or clerical work in both the private and the public sectors.

The Fire Service Act CAP F29, LFN 2004

An Act to make provision for the organisation, discipline, powers and duties of the Federal Fire Service, and for matters incidental thereto or connected.
The Fire and Rescue Services Act 2004 sets out the responsibilities of Fire and Rescue Authorities (FRAs). There are four key responsibilities for FRAs that they must ensure that they make provision for including: extinguishing fires in their area. protecting life and property in the event of fires in their area.

Abuja Environmental Protection Board (AEPB) Act No. 10 of 1997

The Statutory Legislation applicable to the Federal Capital Territory Abuja.
The Abuja Environmental Protection Board, established through the act, is saddled with the following functions through its Departments, Units and Sections.

- Enforcement of all environmental legislation and abatement of all forms of environmental degradation and nuisance.
- Minimization of impact of physical development on the ecosystem.
- Preservation, conservation and restoration to pre-impact status of all ecological processes essential for the preservation of the biological diversity.
- Protection and improvement in air, water, land, forest and wildlife in the ecology of the FCT.
- Municipal Liquid and Solid Wastes collection and disposal/sanitation management services including i.e. connection of plots to central sewer line
- Pollution control and environmental health – fumigation and vector control services.

Abuja Environmental Protection Board Guidelines

The Abuja Environmental Protection Board is responsible for enforcing and coordinating policies, statutory laws on general environmental protection, flood control and regulation of the ecological system and all activities related therein in Abuja FCT. Other functions of the AEPB related to the facility include:

- Ensure effective harmonization with the FMEnv in order to achieve the objectives of the National Policy on the Environment;
- Co-operate with other relevant regulatory agencies in the promotion of environmental education;

Monitor the implementation of the EIA and Environmental Audit Report guidelines and procedures on all developmental policies and projects within the FCT.

International Conventions and Agreements

The Nigerian government is an important player in the international support for the protection of the environment. As such, the country is a signatory to some international laws and conventions, which are targeted towards conservation and protection of the environment. The international conventions and agreement considered relevant to the proposed project and the EIA study include:

African Convention on the Conservation of Nature and Natural Resources

The African Convention on the Conservation of Nature and Natural Resources was adopted in Algiers, Algeria, on September 15, 1968 and entered into force on June 16, 1969. The Convention stipulates that the contracting States shall undertake to adopt the measures necessary to ensure conservation, utilization and development of soil, water, flora and fauna resources in accordance with scientific principles and with due regard to the best interests of the people.

Convention Concerning the Protection of the World Cultural and Natural Heritage

The Convention was adopted in Paris, France on October 17, 1972. The Convention sets aside areas of cultural and natural heritage for protection. It places obligations to each State Party to recognize that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage situated on its territory, belongs primarily to that State.

Convention on the Conservation of Migratory Species of Wild Animals

This Convention also known as the Bonn Convention was adopted in 1979 and entered into force in 1983. It stipulates actions for the conservation and management of migratory species including habitat conservation.

Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention was adopted in 1985 and entered into force on September 22, 1988. It places general obligations on countries to make

appropriate measures to protect the environment against adverse effects resulting from human activities which tend to modify the ozone layer.

The Montreal Protocol on Substances that Deplete the Ozone Layer

The Protocol was adopted on September 16, 1987 as an international treaty to eliminate ozone depleting chemicals production and consumption.

Basel Convention on the Control of Trans-Boundary Movement of Hazardous Wastes and their Disposal

The Convention was adopted on March 22, 1989 and entered into force on May, 1989. It focuses attention on the hazards of the generation and disposal of hazardous wastes. The Convention defines the wastes to be regulated and controlled in other to protect human and environmental health against their adverse effects.

The United Nations Convention on Biological Diversity

The convention was adopted in 1994. The objectives of the Convention include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

1.7 EIA Outputs

EIA outputs will include:

i. Provide description of the proposed project with focus on potential impacts to the surrounding environment,
ii. Carry out a systematic environmental assessment following the FMEnv. and NMDPRA regulations,
iii. Produce an EIA report that should contain among other issues identification of key environmental aspects, recommendations on appropriate mitigation measures to minimize or prevent any adverse impacts,
iv. Develop an environmental management plan outline.

1.8 The EIA Report Organization and Structure

The EIA is structured into eight (8) chapters preceded by an Executive Summary that summarizes the report.

Chapter one (1) presents the introduction, study objectives/Regulatory framework, EIA terms of reference, work scope and methodology. It also

provides information on the legal and administrative framework for the EIA in Nigeria as applicable to the proposed project. Chapter two (2) examines the justification for project and its alternatives.

Chapter three (3) describes the technical details of the project. This includes the processes and design., project activities and it further highlights the waste management programmed for the operation, petrol station abandonment/decommissioning and the project.

Chapter four (4) describes the methods adopted in environmental data acquisition, description of the physical, chemical, biological as well socio-economic of the proposed project site.

Chapter five (5) highlights the impact assessment approach and presents the potential and associated impacts of the proposed development.

Chapter six (6) presents the mitigation measures to be applied and highlight the beneficial impacts of the proposed activities.

Chapter seven (7) provides the environmental management plan (EMP) that shall be adopted throughout the projects lifecycle and ensure the effectiveness of the mitigation measures. Also, it outlines the decommissioning and abandonment plans of the project and finally,

Chapter 8, the conclusions with a brief summary of the key findings of the study. The list of the references and appendices are included thereafter.

CHAPTER TWO
PROJECT JUSTIFICATION

2.0 Introduction

For any project to be justified, it must be socially acceptable, economically viable and beneficial to its host community, and above all environmentally friendly. Thus, a Petrol Filling Station project can be justified provided it satisfies the above three-dimensional perspectives that constitute the basic ingredients required for the sustainability of any developmental project generally.

2.1 The need for the project

Petroleum products (PMS, AGO & DPK) have huge benefits in their day-to-day use as energy, particular for powering engines, cooking and heating.

A Petrol Filling Station is a retail outlet of petroleum products and therefore an integral part of the downstream sector of the oil industry which is the major contributor to the national economy. From this perspective therefore, a petrol station if appropriately constructed and operated will not only positively impact on its immediate community both socially and to a certain extent economically, but more importantly it is performing a vital function of bridging the end user with the supplier and by so doing contributing to the efficient running of this vital sector of the economy. This is achieved through the provision of a convenient fuel filling and vehicles repair around the community. In addition, the station will generate income to the many workers who will be employed, the proponents and national economy will be boosted through revenue collected, therefore, the need of the proposed JRB Oil & Gas Limited, Mpape Abuja FCT.

2.2 Benefits of the project

The establishment of JRB Oil & Gas Limited Mpape Abuja, FCT will ease accessibility to petroleum products to inhabitants of the neighborhood. This will lead to creation of jobs for the teeming population of unemployed persons in the project area. This will in turn leads to reduction in crimes because the people will gainfully be engaged. The transfer of the technology to be adopted will also lead to an improvement in the social and economic life of the people in the project area of influence. This investment should be given a high priority.

2.3 Value of the project

The total value of the project that becomes part of the local economy comprises the sum of the investment, the direct value as well as the associated values from the operations of the project. The total value of the proposed petrol filling station project is one hundred and fifty-five million naira only (₦155,000,000.00). The life span of the project is placed at greater than 25 years. Thus, the value of the project to the national economy includes the direct investments, as well as the value-added returns that are accruable in implementing the project, such as improved employment opportunities and better living conditions for the host communities.

2.4 Envisaged Sustainability

The sustainability of any economic venture largely depends on the market forces of supply and demand particularly and other social, economic, and environmental considerations in general. A developing economy with a rapidly growing population like Nigeria will progressively consume more energy not only for industrial production but also for the day-to-day domestic and commercial activities. And such an economy will obviously create a large market for such vital and basic petroleum products internally.

Nigeria being the tenth largest oil producing country in the world and the sixth largest producer within OPEC is expected to sustain its production of crude oil over the next 35 years based on estimates of current known reserve and given the current rate of production of two million barrel per day. Needless to emphasize that, though the capacity utilization of our refineries could barely refine a quarter of our domestic needs the deficit is covered by import of refined petroleum products as witnessed over the last few years. The site is also strategically located within a commercial layout where there is no any nearby existing filling station, thus, makes it ideal for the location of such a commercial venture.

2.4.1 Environmental sustainability

The proposed filling station project shall be undertaken using the best available technology in the industry and in strict compliance with the appropriate requirements of the Environmental Regulatory and Town Planning Agencies, in the country, specifically:

All facilities be designed and / or constructed to keep environmental impact at acceptable levels,

All project activities will be executed task by task in order to ensure maximum safety during the site construction and throughout the period of the project, and,

The petrol station project shall comply with all setbacks required by the Town Planning Regulations.

This project would have some potential negative impacts on the environment. However, incorporating the findings and recommendations of this EIA, and implementing an effective Environmental Management Plan, at the planning, design, construction, operation stages of the proposed projects, will ensure its environmental sustainability.

2.4.2 Technical Sustainability

Best and the right materials shall be use in the construction of the petrol filling station and its ancillary facilities. The petrol station shall be built, operated, and maintained to acceptable industry standards. The proposed project would therefore be technically sustainable in view of the proven technologies to be adopted by the project proponents, with strict adherence to the Engineering design, construction standards and codes of practices at any substation, the technologies to be adopted is to adhere strictly to local and International Regulations (such as SON, ISO etc.) for best quality, durability, accurate operational signal, command flexibility & tolerance-accuracy. The proposed project lifespan is estimated to be 25 years with continues facility maintenance and operation in environmentally safe manner.

2.4.3 Social Sustainability

Social sustainability of the project is hinged on the policy of ensuring cordial relationship with stakeholders and communities by the contractor and the proponent through consultation throughout the various phases of the project. It has also been planned that local people will be given priority in terms of employment both in the construction and operation phase of the project implementation.

2.4.4 Economic Sustainability

Normally petrol filling station shall exist for an estimated period of 25 years in the country. It is therefore anticipated that the construction of the project will positively enhance the Economic life of the project area whose daily Economic activities require alternative source of fuel for both domestic and other uses. This would in turn ensure returns on investment to the project owners.

In addition, the project has local and national economic values in terms of employment opportunities for various categories of Nigerian professionals, skilled and semi-skilled craftsmen, business opportunities and additional revenue for the government.

2.5 Consideration of Project Development Alternatives

In fulfilling the requirement for environmental sustainability of the proposed JRB Oil & Gas Limited, attempt was made to evaluate alternatives in order to meet the ultimate objective of the project. Thus, the following alternatives were considered:

2.5.1 The no project option

The delayed project option;
The site relocation option;
The project may proceed as proposed option.

2.5.2 The No Project Option

This option is rejected for the following reasons:
From data available in this EIA study, there seem to be no adverse legal, administrative, cultural, archaeological, biophysical, land use, community relations, socio-economic and health hazards reason that would prevent the implementation of the project. The project is justified on grounds that it is financially sustainable and economically viable.
A no project option therefore is rejected.

2.5.3 The Delayed Project Option

This option implies that the planned deployment of the proposed JRB Oil & Gas Limited located at Mpape Abuja FCT will be delayed until a much later date. Such option is usually taken when conditions are unfavorable for project implementation. For instance, in a situation where there is war or the host community is deeply resentful of the project. Also, if the economics of the project are unacceptable or unattractive at the time, then a delay may be feasible. But none of these conditions are applicable. In fact, on the contrary, both the economics and the political environment are most favorably disposed towards the project. Owing to the inflationary trends in Nigeria, such a delay may result in unanticipated increases in project costs, leading to a decrease in final profit accruable from the project. The delayed project option is therefore rejected.

2.5.4 The Site Relocation Option

The proposed site was selected based on specific petrol filling station criteria known as 'line of sight' for the selection of an appropriate site for the deployment of a filling station infrastructure. The proposed locations would not pose any additional traffic problems to the environment in which it will be sited. In addition, there were no adverse/negative associated/potential impacts in this study as would be shown later that would necessitate the adoption of an alternative site for the proposed filling station.

2.5.5 The project may proceed as proposed option

The present democratic dispensation which started in 1999 has created more room for the growth of more petrol filling station retail outlets in the industry. It is therefore in the interest of JRB Oil & Gas Limited to take advantage of this development. After due consideration of all the project alternatives, the option of embarking on the project as proposed was chosen as the most suitable and feasible alternative for the proposed project.

In this case, alternative 4 is chosen because the proponent has completed plans to embark on the project as proposed.

CHAPTER THREE

3.0 Project Description

The proposed project is a Petrol Filling Station with underground storage facilities and dispensing pumps for petroleum products.

This will include the following processes

- Obtaining, unloading of refined petroleum products
- Offloading of the petroleum products
- Storage of the petroleum in the underground storage tanks
- Dispensing of the petroleum products to customer vehicles
- Sale of lubricants which include engine oils, brake fluid, distilled water, etc.
- A store and an office

3.1 Project Objective

The objective of the proposed project is to provide fuel for the people of Abuja and commuters along the Kubwa Express way, create employment as well as generate income for the proponent.

3.2 Project Site Location description

The proposed project is located at Plot No. 186, Cadastral Zone F04, Mpape District, Bwari Area Council, Abuja FCT. The GPS location at the center of the site is between Latitude 9° 7'7.01"N and Longitude 7°27'8.20"E on elevation of 979.9 meters above sea level on an area of 7,186.68m^2.

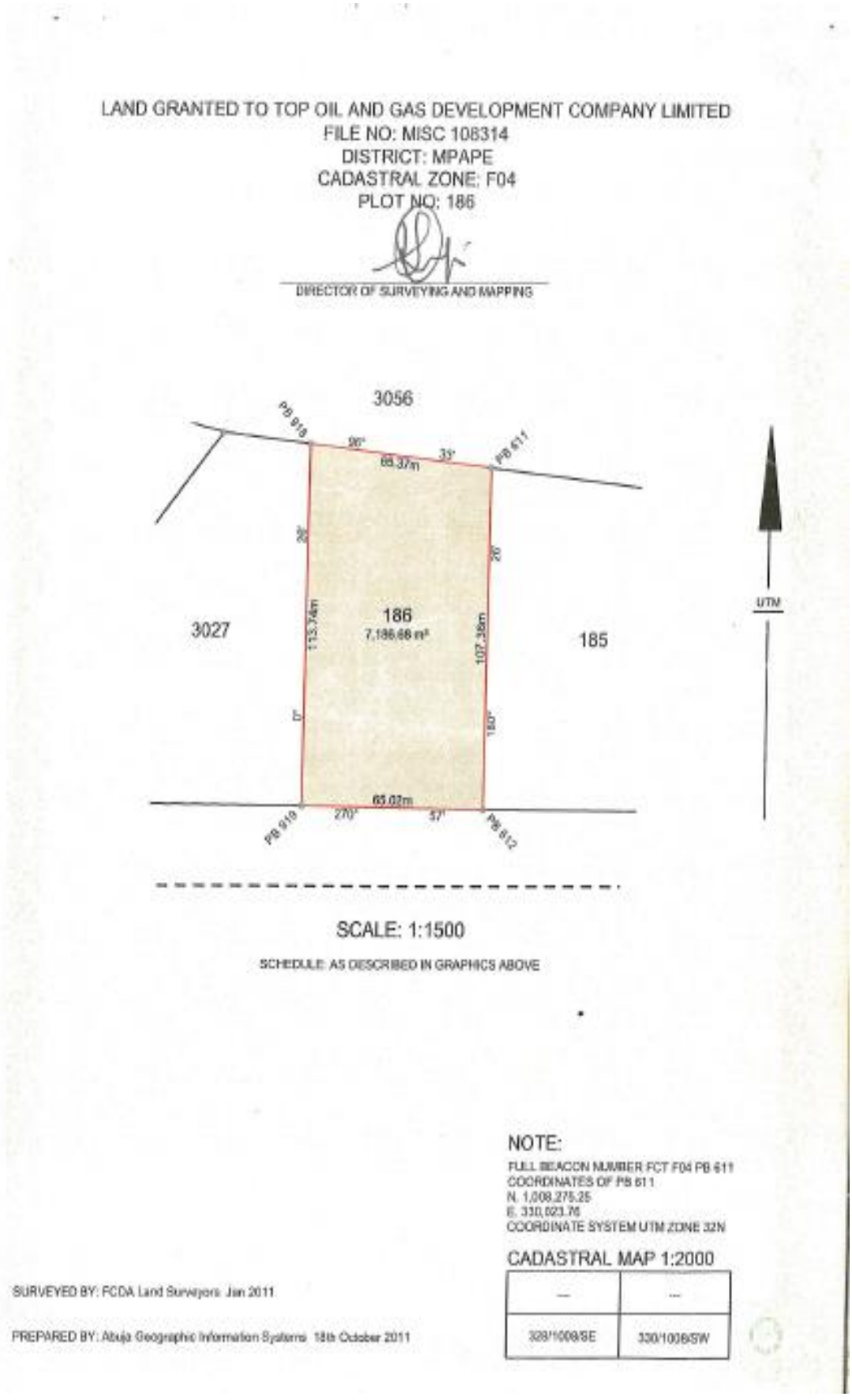


Figure 3.1 Site Survey Plan

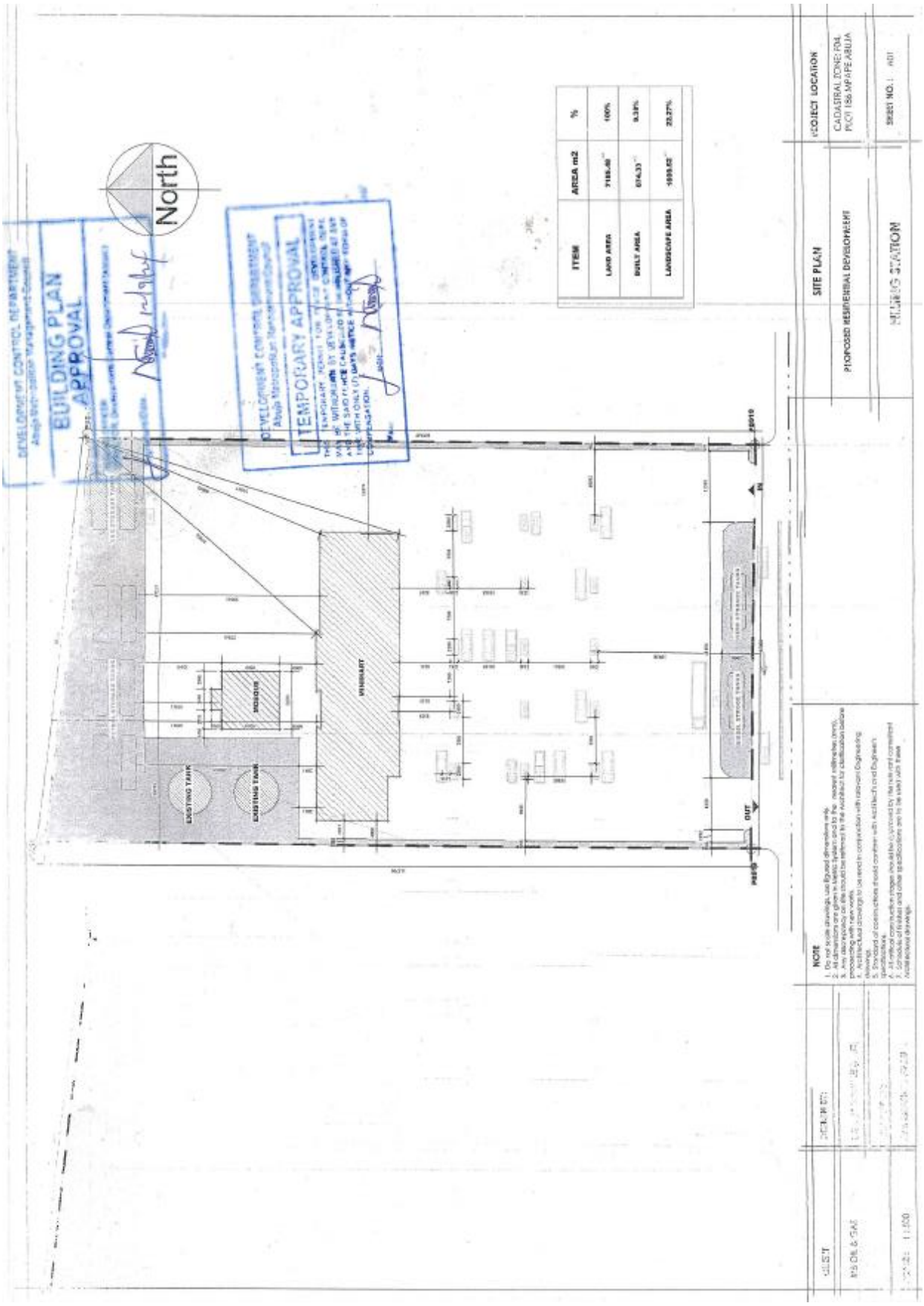


Figure 3.2 Proposed Site Development Plan

3.2.1 Site Location Analysis

Planning is regarded as an activity which is concerned with making choices about future options, considering probabilities and the value of what may be achieved, and then securing the implementation of the chosen option. The main issue is that, planning is part of the organization of the society and that some control over the use of land is, and will continue to be, an important component of that organization. Planning is therefore a central activity to guide from his needs continually place demand and pressure on the limited and resources available to him. Where consumption of land for these needs is not organized, it would lead to physical, environmental and social stress and anarchy. The use of land must therefore be consciously and rationally ordered to prevent waste and want.

This is why a great philosopher, Eliel Saarinen once said, "… *because the city must be formed into an appropriate place in which to live, human considerations have a dominant position in its formation; physical dispositions must be adjusted accordingly. Man is the master; physical dispositions are to serve him…*"

The statement above gives credence to the need for man to make efforts to control his destiny and derive pleasure through orderly improvement of his environment. It is therefore important that the complexity of the environment be adequately comprehended, technically and articulately designed, and rationally implemented to enhance its sustainability. This is the reason why detailed site analysis must be conducted before investment decisions are concluded.

Highlights of site analysis and adjoining land uses

The analysis conducted confirms that the site has the following characteristics:

- Site is accessible from the busy Kubwa Express Way on a setback of about 30 meters.
- The site is adjoined due north and east wards by undeveloped land, due west by AFDIN Petroleum petrol filling station and due south by the busy Kubwa Express way.
- Residential houses are located across the busy Kubwa Express about 350 meters away due south of the proposed project site.
- There are no encumbrances on the land.
- The plot is not revoked.
- It does not obstruct traffic circulation within the vicinity.
- Site is not on a flood plain neither is it liable to flooding since it is not directly adjoined to the stream.

- There are no records of earth movements or instability in the soil conditions around the site.
- The proposed petrol station has not violated the building line or the general physical character of the site,
- The proposed site will not generate waste and effluents that will inhibit the aesthetics and general environmental character and quality of the immediate developments.
- It will not generate noise that has adverse effects on the neighborhood.
- Municipal Waste Management Accredited Contractor shall handle waste management.
- Site is not traversed by any service line as well as sewers, water mains, high tension power transmission line.
- The proposed project will not constitute security risk.

3.2.2 Topography and Drainage

Granite, schist and quartze's predominating the area but the most conspicuous relief features, which consists of isolated or mass inselbergs are associated with the older granite. The area consists of gently undulating topography with hills and mountain ranges.

The proposed project site slopes gently to the south western direction. There is no surface water body around the proposed project site The site road side drainages have been constructed.

3.2.3 Utilities & services

- The area is connected to the National Grid of Electricity Transmission Company of Nigeria (TCN). Hight Tension Line of TCN is located about 50 meters away setback due north of the project site.
- It is yet to be provided with pipe borne water supply, major sources of water are from boreholes.
- The area is connected to almost all the major mobile telecommunication services in the country.

3.2.4 Present Use of the Proposed Project Site

The proposed project site is a brown field plot of land housing 2 surface tanks farm of diesel product which are not in use. The site has been prepared for the proposed petrol filling station development.

Plate 3.1: AFDIN Petrol Station due West of Site

Plate 3.2: Undeveloped Plots due East of Site

Plate 3.3: Busy Kubwa Express due South of Site

Plate 3.4: Undeveloped TCN High Tension Set-Back

3.2.5 Aesthetics

The proposed project site will add more beauty to the area if the planned designed is properly implemented.

3.2.6 Environmentally Sensitive Areas (ESA)

The proposed project site is not marshy nor swampy; it has no social or cultural constrains.

3.3 Project Components

The design of the proposed petrol station encompasses the construction of station building and canopy over the pumps island, the installation of seven (7) cylindrical underground storage tanks of 45,000 liters each with a combined

capacity of 315,000 liters and dispensing pumps. Other structures planned at the site include a separate building to house power generating plant. Initial construction activities include excavation of the soil for burying of storage tanks and for installation and lying of pipes.

The proposed development will thus involve the following as key activities:

- Land acquisition
- Project Design and approval
- Site Preparation
- Removal of all Debris from the site
- Excavation of underground tanks pits
- Civil construction
- Installation of equipment
- Commissioning of the facilities
- Project analyses and environmental risks and hazard/prevention philosophy.
- Description of pollution control/measures, contingency plans and emergency response procedures
- Description of project risk hazards prevention philosophy
- Evaluate project alternatives
- Demobilization

It is important to note here that this facility has no production line or units but have storage and refueling facilities.

3.4 Technical Layout

The detail project layout including the technical plan of components is in the site development plan figure 3.3. The petrol filling station will consist of seven (7) cylindrical underground storage tanks of 45,000 liters each with combined capacity of 315,000 liters. The pumps island will consist of 14 nozzles dispensing pumps with PMS having 15 pumps while AGO has a dispensing pump. These tanks are linked from the underground tanks to their respective service pumps with underground pipes. The products pumps service areas will be provided with a canopy to protect the product, the staff and the customers from the elements of the weather, at least, the best possible. The detail layout of the proposed station facilities and drainage network can be further examined in the site development plan.

Table 3.1 Description of Products Tanks Specifications and Capacities

Products	Tanks	Capacity (Liters)	Total capacity (liters)	No. of Pumps
AGO	1	45,000	45,000	2 pumps
PMS	6	45,000	225,000	15 pumps
TOTAL	7	45,000	315,000	18 double nozzles

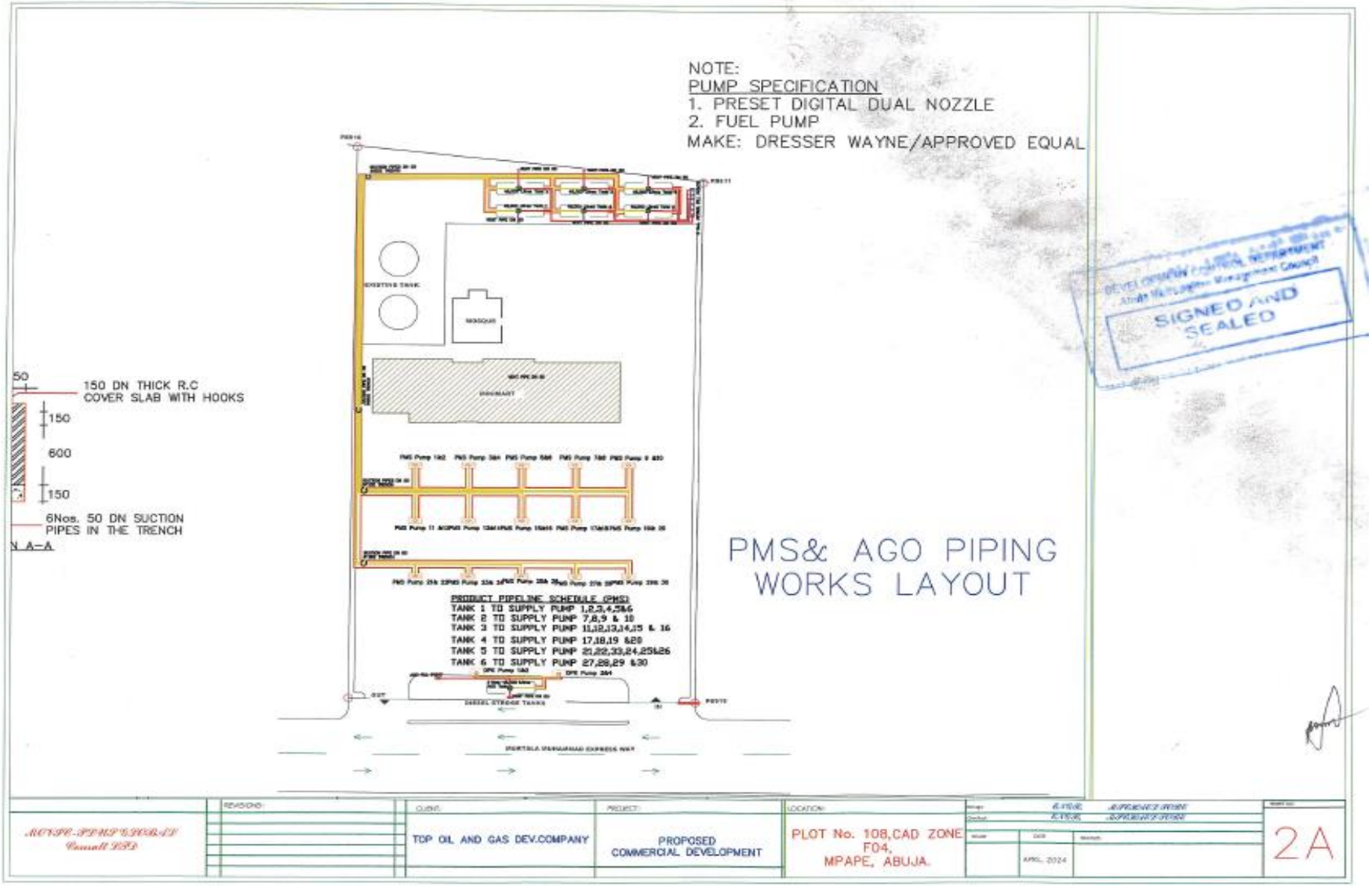


Figure 3.3 General Piping Site Layout Plan

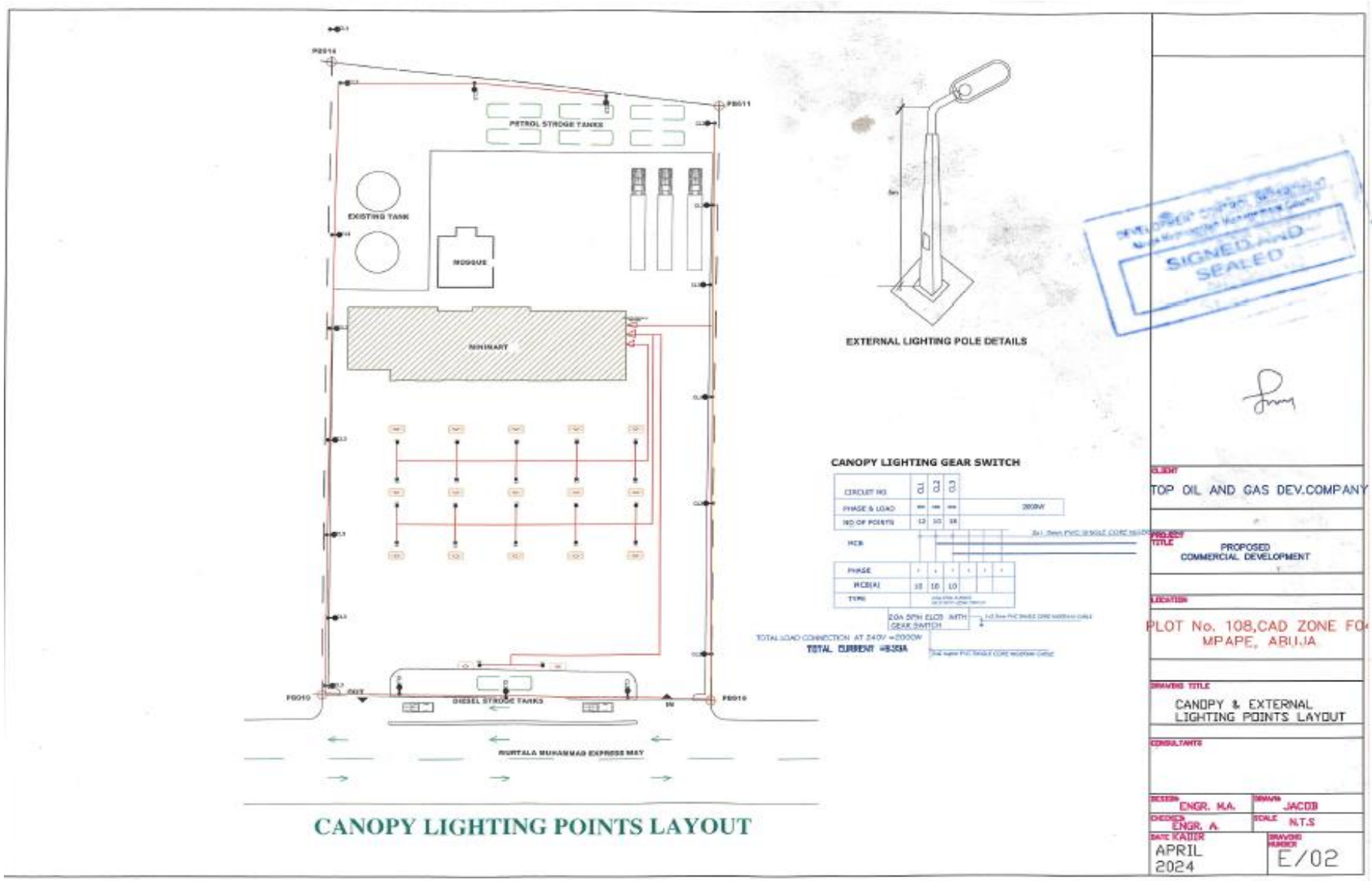


Figure 3.4 Site Layout Plan of Lighting Points

3.5 Proposed Project Activities

The proposed development will involve the removal of top soil, vegetation and the leveling of the site, excavations, laying of foundations and underground tanks. There will also be transportation of construction materials and associated wastes to and from the site respectively. The conclusion of the construction phase will be the establishment of a filling station comprising of features discussed earlier in this report. Since the change in the land surface will impact on the storm water flows, adequate drainage system will be put in place. The design of the project has been executed with due consideration of the existing topography of the proposed project site. In general, the design of the project will optimize the use of the best available technology (BAT) to prevent or minimize potentially significant environmental impacts associated with the project and to incorporate efficient operational controls together with trained staff, to ensure high level business and environmental performances.

3.6 Construction Materials and Technology as per the Nigerian Standards

The building materials will consist of natural stones, sand, and cement. Also, steel pipes, roofing tiles, wall tiles, PVC pipes, steel rods and glass will be used. Other materials that will be used on site include timber. The building will be constructed as per the respective structural engineering detail as provided for in the site plan. Basically, the building structure will consist of concrete appropriately reinforced with metal (steel and iron).

The building will be provided with facilities for drainage of storm water from the roof and canopy through peripheral drainage systems into the storm water drainage system. Drainage pipes will be of the PVC type and will be laid under the building and the driveway encased in concrete. The development will be connected to a septic tank to be put up during project implementation. The development will have adequate natural ventilation through provision of permanent vents in all habitable rooms, adequate natural and artificial light, piped water stored in tanks and above ground water tanks provided with water pumps to feed overhead tanks and firefighting facilities.

The technology used in the design and the construction of the filling station will be based on national and international standards which have been customized in Nigeria. These include building standards including the Local Building Code and the British Building Standards BS 8110 and BS5950, BS4449 and BS4461. Important to note is that the constructions will incorporate; The

Environmental Protection and Resource Conservation guidelines Occupational Health and Safety measures.

3.7 Project Site Utilities and Services

Utilities

The filling station will have a comprehensive and robust infrastructure including, parking area, water storage, electricity distribution and waste disposal points.

Electricity

The site will be connected to the electricity main line of the TCN power company through the Abuja Electricity Distribution Company (AEDC), which will be in all phases of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. A generator of 27kva has been proposed to provide alternative power supply in events of power outage from the national grid.

Water

Water will be source from both municipal supply and borehole to be provided by the proponent which will be used during construction and operational phases of the filling station. More so there will be an overhead water storage tank of 3000 liters capacity.

Solid Waste/ sewerage

Solid waste collection centre for the entire station will be located strategically and covered on top and on the sides to protect against weather and scavengers. The waste will then be collected by the area council licensed waste collectors for onwards disposal at designated approved dumping sites. Waste bins will be provided for each section for temporarily holding of waste before delivery into the central solid waste collection area. This report recommends the construction of a pit oil water interceptor tank, where all runoff water will be directed to before being discharged into the main drainage system.

Security

A guard shall be located next to the main entrance for easy security operations around the compound during construction and there will be guards at all times during the operation phase of the Project.

Parking Area

The parking area will be provided with facilities such as lights, and signs for easy entry and exit to allow free flow of traffic. The parking bay will be inclined to a degree that does not allow stagnation of water and thus linked to storm water drainage system. Parking area floor will be made of concreted surface.

Landscaping

The un-built area will be landscaped after construction, using plant species available locally. This will include establishment of flower pots to improve the visual quality of the site.

Pavement Works

The filing station will have concreted floor covering all open sections apart from the office and sanitary facilities.

3.8 Description of the Project's construction activities

3.8.1 Pre-construction investigations

The implementation of the project's design and construction phase will start with thorough investigation of the site's biological and physical resources in order to minimize any unforeseen adverse impacts during the Project cycle.

3.8.2 Activities during the Construction Phase) Site Office

The contractor shall construct a temporary site office to run and manage all activities at this phase.

3.8.3 Sourcing and transportation of building materials

Building materials will be transported to the project site from the approved extraction, manufacture, or storage sites using transport trucks compliant with the traffic regulations. The building materials to be used in the construction of the Project will be sourced from approved dealers. Greater emphasis will be laid on procurement of building materials from within the local area, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

3.8.4 Storage of materials

Building materials will be stored on site. Bulky materials such as rough stones/aggregate blocks, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities on site, the proponent will order bulky materials such as sand, gravel and stones in bits. Materials such as cement, paints and glasses among others will be stored in temporary structures for safe keeping.

Site clearance and fencing (hoarding)

This will involve clearance of the little vegetation that is currently found at the proposed site. The site will then be isolated for public safety and for the security of construction material and equipment.

3.8.5 Excavation and Foundation Works

Excavation will be carried out to prepare the site for construction of the perimeter wall foundations, Underground Petroleum Storage Tanks (UPSTs), pavements, drainage systems and other Substructures as per the engineer's detail. This will involve the use of heavy both heavy exaction equipment and in some cases manual excavation. This process will generate waste in form of spoil soil and rock particles.

Installation of tanks, erection of pumps and backfilling

The underground fuel storage tanks and fuel pumps will then be installed as per the project design. The pits will then be backfilled with hard core and compacted soil.

3.8.6 Masonry, Concrete work and related activities

The construction of the building walls, foundation, floors, pavements, drainage systems and parking area among other components of the Project will relatively involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, and slab construction, construction of foundations and erections of building walls, the canopy and curing of fresh concrete surfaces. The steel canopy will have three columns.

3.8.7 Structural Steel Works

The associated Canopies will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection. The

station canopy will be made up of steel truss and the column and beam will be cast monolithically.

Construction of super structures

This will entail construction of superstructures including the convenient store which will comprise of toilets, a mini mart, display shop, office and other proposed elements.

3.8.8 Roofing and sheet metal works

Roofing activities will include sheet metal cutting, raising the roofing materials such as tiles and structural timber to the roof and fastening the roofing materials to the roof for the associated buildings and structures while the ago pump and PMS pumps will have a steel canopy over them in line with the Petroleum Act.

3.8.9 Electrical works

Electrical work during the construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, socket set, etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

3.8.10 Plumbing

Installation of pipe work for water supply and distribution will be carried out at the filling station, sanitary facilities and at the water refill point. In addition, pipe work will be done to connect sewage from the premises to the septic tank, and for drainage of storm water from the roof top into the peripheral storm water drainage system. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

Installation of fire protection equipment

The appropriate firefighting equipment (carbon dioxide, dry powder, foam and bucket of sand) will then be installed.

Other fittings (builders works)

These will include reinforced concrete beams, fuel dispenser shed, site lighting and other necessary fittings.

Work testing and project commissioning

The installed equipment will then be tested for functionality and commissioned to the satisfaction of the presiding engineer.

Development of support infrastructure

The proponent will also have to develop the necessary support infrastructurei ncluding creating a motorable access road to the station, water supply, toilet facilities (must ensure they are within reach), wastewater disposal facilities and necessary connections.

3.9 Description of Project Operational Activities

3.9.1 Offloading and dispensing of products

The major operation of the petrol filling station is the offloading (discharging) of refined petroleum product into the underground storage tanks. These tanks are linked to their respective service pumps with underground pipes for onward dispensing to customers.

3.9.2 Operations and Processes

The proposed filling station will have its core business revolving on the retailing of petroleum products as listed above. It will offer a wide range of petroleum products including lubricants.

The proposed operations and processes of the Station are as follows:

- Procurement, receipt of refined petroleum products
- Offloading of the petroleum products
- Storage of the petroleum in the above ground storage tanks
- Dispensing of the petroleum products to customer vehicles or containers Sale of lubricants which include engine oils, brake fluid, distilled water, etc.
- Maintenance activities will include facility cleaning, underground tanks and dispensers routine checks and other necessary repairs.
- There will also be car washing, wheel balancing services and shopping at the convenient store.

3.9.3 Solid waste generation on occupancy

Various activities such as use of sanitary facilities, servicing area and operation of the station in general, will result in the production of a lot of solid waste including used oil and grease containers as well as papers. The proponent will

provide facilities for handling solid waste generated within the station. These will include dust bin for the sections, a central waste collection for temporarily holding waste within the premises before segregation and final collection for transportation.

3.9.4 Waste water management

Sewage generated from the proposed site will be discharged into the facility's' septic tank, while storm water from the project area will be channeled into water drainage system that will be developed within the site. However, before discharge of runoff water into the peripheral storm water drainage systems, this assessment recommends the construction of a three-pit oil-water interceptor tank to aid in the removal of oil and grease from the runoff water.

3.9.5 Cleaning

Proponent will employ people who will be responsible for regular washing and cleaning of the pavements, and other common facilities. These people will be responsible for gathering and delivering waste onto the central collection place provided within the station. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

3.9.6 General Operations, repairs and maintenance

The nature of the project has already been described above. The major operations of the project are the storage and sale of refined petroleum products, namely, petrol, diesel and kerosene. The products will be delivered by trucks and discharged into the petrol station underground tanks. It is from these storage facilities that the products will be pumped to the filling and refilling service pumps. The service pumps are calibrated based on price per quantity dispensed to a customer. The petrol (PMS) will be dispense using Fifteen double nozzles pumps while diesel (AGO) has a double nozzle pump.

The station and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls, the canopy and floors, repair and maintenance of electrical fittings and equipment, repairs of leaking water pipes, painting and replacement of worn-out materials among others.

A motor service bay is also provided for the maintenance of vehicles that may require attention. The station will maintain a technician on call-duty basis for

the maintenance of service pumps and other facilities while the station management will be managed on full time basis by the station manager.

3.9.7 Input and Output of Material

The major input here is petroleum product which will be loaded or bridged from NNPC depots around the country and other private depots and then discharged into the buried underground tanks in the filling station for subsequent dispensing to consumers. The products include: Petrol (PMS) and Automobile Gas Oil (AGO). Output will also be in the form of waste both liquid and solid wastes that may emanate from the filling station operation.

3.10 Traffic Management

An effective traffic control management must be ensured by the management for the control of vehicular traffic in out of the station during construction and operation.

- It should be boldly written on a sign post at least 250 meters away 'SLOW DOWN YOU ARE APPROACHING' "A CONSTRUCTION SITE" (during construction) and "FILLING STATION" (during operation) along the major road. Other signs such as 'NO PARKING' "KEEP MOVING".
- There shall be speed bumps on the road to slow down speeding vehicles that may cause accidents when vehicles wish to turn into the filling station.
- The management shall set up a common transport system for her employees with a view to encourage mass transport.

3.11 Decommissioning Activities

3.11.1 Dismantling of equipment and fixtures

All equipment and fixtures including form wood will be dismantled and removed from the site on decommissioning of the Project. The contractor will ensure safe dismantling of the scaffolding, form wood used for reinforced concrete beams and columns, temporary store and site office.

3.11.2 Removal of waste

Waste from construction of the proposed development will be carted away and disposed of at the approved sites. Waste found at the site will include the remainder of non-re-usable construction materials from:

- Masonry works/building works, (cement bags, broken building blocks, etc.)
- Roofing (broken tiles, timber pieces, steel and iron bar etc.)
- Painting, (paint cans, reject paints, masking tapes, etc.)
- Carpentry and joinery work (timber, nails, glue, etc.)
- Plumbing (pipe fittings and off cuts, etc.)
- Electrical works (residual cables and connectors, damaged electrical fittings, etc.) Wastes generated from dismantling of fixtures and construction equipment.
- Wastes generated from wrappers and packaging material

3.11.3 Site restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the open earth sites will be restored through replenishment of the top soil and re-vegetation using indigenous plant species.

3.12 Estimated Project Workforce

In the Construction phase, the project will employ about sixty (60) people directly, roughly comprising of four (4) skilled, six (6) semi-skilled and sixty (50) Laborers.

In the operational phase, the project will employ about thirty-six (36) people directly, roughly comprising of: The station manager; two (2) supervisors; twenty (20) pump attendants; two (2) maintenance engineers; six (6) security men and five (5) cleaners. However, during employee recruitment, priority will be given to qualified persons from the host community, followed by those from nearby communities. This will be in accordance with a Local Content Plan to be designed by the contractor and vetted by JRB Oil & Gas Limited, FMEnv and NMDPRA. The Local Content Plan will ensure that whenever possible qualified skilled and non-skilled positions are reserved strictly for people from the project host communities and that on-the-job training is made an integral part of the recruitment policy of the contractor.

3.13 Project plans/schedule

The preconstruction activities at the proposed site are expected to be completed about a year thereafter. The planned project activities and their approximate timelines, and schedules are shown in Fig. 3.6.

Project Activities	**Year 2025**			**Year 2026**						**Year 2027**			
	Months			**Months**						**Months**			
	Jul-Aug	Sept-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Jan-Feb	Mar-Apr	May-Jun	
Land Acquisition and survey													
Project Meetings													
Preliminary site visit													
NMDPRA Site Suitability													
EIA and community consultation activities													
FMEnv EIA Approvals and Permits													
Vegetation Clearing/Site Prep													
Preconstruction Activities													
Mobilization to Site													
Civil Works and Building Construction													
UST Installation and associated facilities													
Demobilization from site													
Commissioning/Operation													

Figure 3.5 Proposed Work Schedule for the proposed JRB Oil & Gas Limited

CHAPTER FOUR

DESCRIPTION OF EXISTING ENVIRONMENT

4.1 INTRODUCTION

In this section of the report, we will present the environmental status of the facility site. These include site's general geographical information, land use, environmental sensitivity, soil characteristics, air and water quality baseline data, and other socio-economic information. This information is primarily derived through:

(a) Field data collection
(b) Interactive interviews and discussions
(c) Literature review
(d) Laboratory analysis of data collected

4.1.1 Scope of Study

The scope of the study is divided into (8) study areas, namely

- Climate and Meteorology
- Geology and hydrogeology
- Air quality, Noise and Dust Emission
- Soil
- Water Studies
- Vegetation and Wildlife
- Land use
- Socio-economic and health

4.2 BASELINE DATA ACQUISITION METHODS

The approach adopted in collecting the baseline data incorporated all relevant disciplines. The baseline data of the project area was acquired, using the following methods:

- Literature/Desktop Research.
- Field Observation.
- Sampling and Measurements.
- Laboratory analysis of samples collected in the field.

The methods used for the acquisition of data are described in detail at the beginning of each study parameter.

4.2.1 Field Sampling and Observation

Field samplings and observations were carried out to cover relevant aspects of the baseline data acquisition. This was aimed at determining the ecological characteristics of the project area. JRB Oil & Gas Limited field sampling was conducted for only one season. The data gathering exercise was conducted in February, 2026. Visual observations were made and documented in the field notebook.

Photographs of important features were taken with **Samsung Galaxy Tab** digital camera. The neighborhood in which the petrol station is located was studied to obtain baseline environmental data. The proposed project spatial boundary is 2.5km radius. This spatial delineation formed its basis on the NMDPRA guidelines on stipulated distance of 400 meters between two filling station and not more than four petrol stations within 2km on the same side of the road.

4.3 SAMPLING METHODOLOGY

4.3.1 Sampling Points Geo-referencing

The coordinates of the proposed site were determined using *Garmin 60GPSmap Versatile Navigator.* Samples of soil and portable water were collected around the proposed project site and taken to AEPB Lab at Asokoro for analysis while onsite air quality and noise level measurement were carried within and around the proposed project site. Encarta map and GPS were used in identifying the project site and sampling location.

At the project site, considering the technical layout we identified the various components of the project and proposed mitigation/corrective measures.

- Google map and GPS were used for the project site location and sampling locations with respect to grids.
- During the study, we sketch the existing adjoining land-use properties which help in determining the suitability of the proposed project in the area.
- Total of Ten (10) soil samples in five (5) locations were taken within and around the proposed project site for the assessment and control. Three of the samples were collected from within the proposed project site as test samples while two were collected from the up and down stream of the proposed project site as control samples. These samples were taken by

the use of soil augur 0-15cm for surface samples and 15-30meters for subsurface samples and wrap in foil paper.

- Water sample was collected from a borehole within the proposed project site for ground water. No sample of surface water conducted as there is none nearby to site. These samples were collected with 1-2-liter dark amber glass/plastic bottles to check physio-chemistry. In-situ measurement of some unstable parameters of water sample such as pH, conductivity, Total Dissolve Solids, and temperature was also carried out. The level of ground water table and direction of flow were determined.

- Both water and soil samples were preserved in a plastic container (cooler) in the field and later transported to the lab and refrigerated at 4^0C.

- Ambient air quality parameters (So_x, No_x, Co particulates etc) were measured in-situ using air quality analyzer. The air quality was measured in Ten Sampling points within and around the proposed project site with two other locations outside the proposed project site as control taking into consideration areas of vulnerable receptors.

- Soil, water and air samples were collected in line with standard scientific guideline while the quality control for laboratory analysis was in accordance with recommended standard methods and include duplicate analyses to establish precision, spikes and blank samples to determine analytical accuracy. In-situ measurement of some unstable physio-chemical parameters like pH, conductivity, TDS and Temperature were carried out so as to ensure reliability and accuracy of the analysis.

- Data on the following parameters: climate, temperature, relative humidity, wind direction and wind speed were collected and examine through literature review.

Figure 4.1 Satellite Image of Sampling Location

4.1.4 Sampling Pictures

Plate 4.1: Borehole Water In-situ Measurement on Site

Plate 4.2: Soil Sampling on Sit

Plate 4.3: Air Quality Assessment on Site

4.4 ANALYTICAL METHODOLOGY/QUALITY ASSURANCE

The quality assurance procedure and standard used in this EIA are those acceptable to ISO, WHO, FMENV and NMDPRA, and it covers all facet of the work which include; sample collection, handling and laboratory analysis, data coding and manipulation, statistical analyses, presentation and communication of results. A sample chain custody form was used for the registration and tracking of samples from the field to the laboratory.

Air, soil and water sampling were conducted in line with international scientific guideline and standard. The quality control for laboratory analysis is in accordance with standard recommended method and includes blank analyses to establish analytic level, duplicate analyses to establish analytical precision, spiked and blank samples analyses to determine analytical accuracy.

Table 4.1 Nigerian Ambient Air Quality Standard

Pollutants	Time of Average	FMEnv. Limit
Particulate	Daily average of hourly Values 1hr	250μg/ m^3-600μg/m^3
SOX as SO_2	Daily average of hourly 1hour daily average of 3 hourly values	ppm (26 μg/m^3) (260 μg/ m^3)
NOx as NO_2	Daily average of hourly values (range)	0.04-0.06PPM (75-113 ug/ m^3)
Carbon Monoxide	Daily average of hourly Values (range)	10-2ppm (11.4-22. 5μg/m^3)
Chemical Oxidants	Daily average of hourly Values (range)	0.06ppm
No methane Hydrocarbon	Daily average of 8 - hourly valves	160 μg/m^3
Noise	Daily average of hourly Values 1hr	90dB(A)

Table 4.2 Air and Noise Quality Measurement Equipment

S/N	PROPERTY MEASURED	EQUIPMENT/MODEL
1	Carbon Monoxide/Dioxide (CO/CO_2)	Tango TX-1 Single Gas Monitor
2	Sulphur Dioxide (SO_4)	Tango TX-1 Single Gas Monitor
3	Ammonia (MH_3)	Tango TX-1 Single Gas Monitor
4	Hydrogen Sulphide (H_2S)	Tango TX-1 Single Gas Monitor
5	Hydrogen Cynide (HCN)	Tango TX-1 Single Gas Monitor
6	Oxygen (O_2)	Tango TX-1 Single Gas Monitor
7	Chlorine (CL_2)	Tango TX-1 Single Gas Monitor
	Volatile Organic Compounds (VOCs)	Tango TX-1 Single Gas Monitor
8	Dust	Particle Counter (PM 2.5 & PM 10)
9	Noise (dB(A))	Environment Multimeter (MASTECH)

Table 4.3 Analytical methods and equipment used in analysis of water and soil

S/No	Parameters Determined	Equipment/ Technique
1.	pH	Hanna meter 991301
2.	Temperature	Hanna meter 991301
3.	Conductivity, $\mu S/cm^{-1}$	Hanna meter 991301
4.	Salinity	Salinometer
5.	Dissolved Oxygen, mg/l	DO meter, Hanna C2561
6.	Transparency (m)	Secchi disc
7.	Grain size	Granulometry and sedimentation
8.	BOD_5 mg/l	Hach BOD track
9.	NH_4 mg/l	Hanna Photometer C200
10.	NO_3 mg/l	Hanna Photometer C200
11.	PO_4 mg/l	Hanna Photometer C200
12.	SO_4 mg/l	Hanna Photometer C200
13.	THC mg/l	Capillary GL
14.	Aliphatic and Aromatic mg/l	GC-MS
15.	TOC	Graphite furnace and gravity
16.	TDS mg/l	Gravimetry after drying to constant weight
17.	TSS mg/l	Gravimetry after drying to constant weight
18.	Heavy Metal mg/l or mg/m3	AAS, UNICAM 424
19.	Soil Moisture Content %	Gravimetry after drying to constant weight
20.	Soil permeability	Falling heed permeability test
21.	Exchangeable cations mg/l	AAS

4.5 GEOGRAPHICAL INFORMATION

4.5.1 Geology

The FCT is almost predominantly underlain by high grade metamorphic and igneous rocks of Precambrian age.

Generally, these rocks consist of gneiss, migmatites and granites. A schist belt outcrops along the eastern margin of the area. The belt broadens southwards and attains a maximum development to the southeastern sector of the area where the topography is rugged and the relief is high. In general, the rocks are highly sheared (Kogbe, 1978). The rocks of the area can be divided into five major groups, as follows:

Metamorphosed Supracrustal (Exogenetic) Rocks: Mica Schist (sh), Marble (m), Amphibolite and Amphibole Schist (a), Fine Medium Grained Gnesis.
Migmatitic Complex: Migmatite (mi), Migmatitic Gneiss (mg), Granite Gneiss (gg), Porphyroblastic Granite Gneiss (pg), Leucocratic Granite Gneiss (lg). Intrusive Granite Coarse Grained Granite (eg).
Minor Intrusions: Rhyolites (ry), Quartz Feldspar Porphyry (py), Daca titea and Anddesites (an), Dolerites and Basalts (b).
Other Formations: Quartzite (qz), Pegmatite (p), Quartz vein (q).

4.5.2 Relief

The lowest elevation in the Federal Capital territory is found in the extreme southwest where the flood plain of the river Guraja is at an elevation of about 70m above sea level. From there, the land rises irregularly eastwards, northwards and northwestwards. The highest part of the territory is in the northeast where there are many peaks over 760m above sea level. Hills occur either as clusters or form long ranges.

The most prominent of these include the Gawa range in the northeast, the Gurfata range southwest of Suleja, the Bwari Aso range in the northeast, the Idon Kasa range north west of Kuje and the Wuna range north of Gwagwalada. Elsewhere in the territory, there are many rather roundish isolated hills usually called inselbergs. In between the major hills are extensive plains, the most important of which are the Gwagwa plains, the lku Gurara plains, the Robo plains and the Rubochi plains. Indeed, about fifty-two per cent of the Federal Capital Territory consists of plains. Out of these plains, the Gwagwa plain was selected for the building of the Federal Capital City (FCC).

4.5.3 Climate

Abuja under Köppen climate classification features a tropical wet and dry climate (Köppen: *Aw*). The FCT experiences three weather conditions annually. This includes a warm, humid rainy season and a blistering dry season. In between the two, there is a brief interlude of harmattan occasioned by the northeast trade wind, with the main feature of dust haze and dryness.

The rainy season begins from April and ends in October, when daytime temperatures reach 28 °C (82.4 °F) to 30 °C (86.0 °F) and nighttime lows hover around 22 °C (71.6 °F) to 23 °C (73.4 °F). In the dry season, daytime temperatures can soar as high as 40 °C (104.0 °F) and nighttime temperatures can dip to 12 °C (53.6 °F). Even the chilliest nights can be followed by daytime temperatures well above 30 °C (86.0 °F). The high altitudes and undulating terrain of the FCT act as a moderating influence on the weather of the territory.

Rainfall in the FCT reflects the territory's location on the windward side of the Jos Plateau and the zone of rising air masses with the city receiving frequent rainfall during the rainy season from April to October every year.

Table 4.4 Climate Data for Abuja

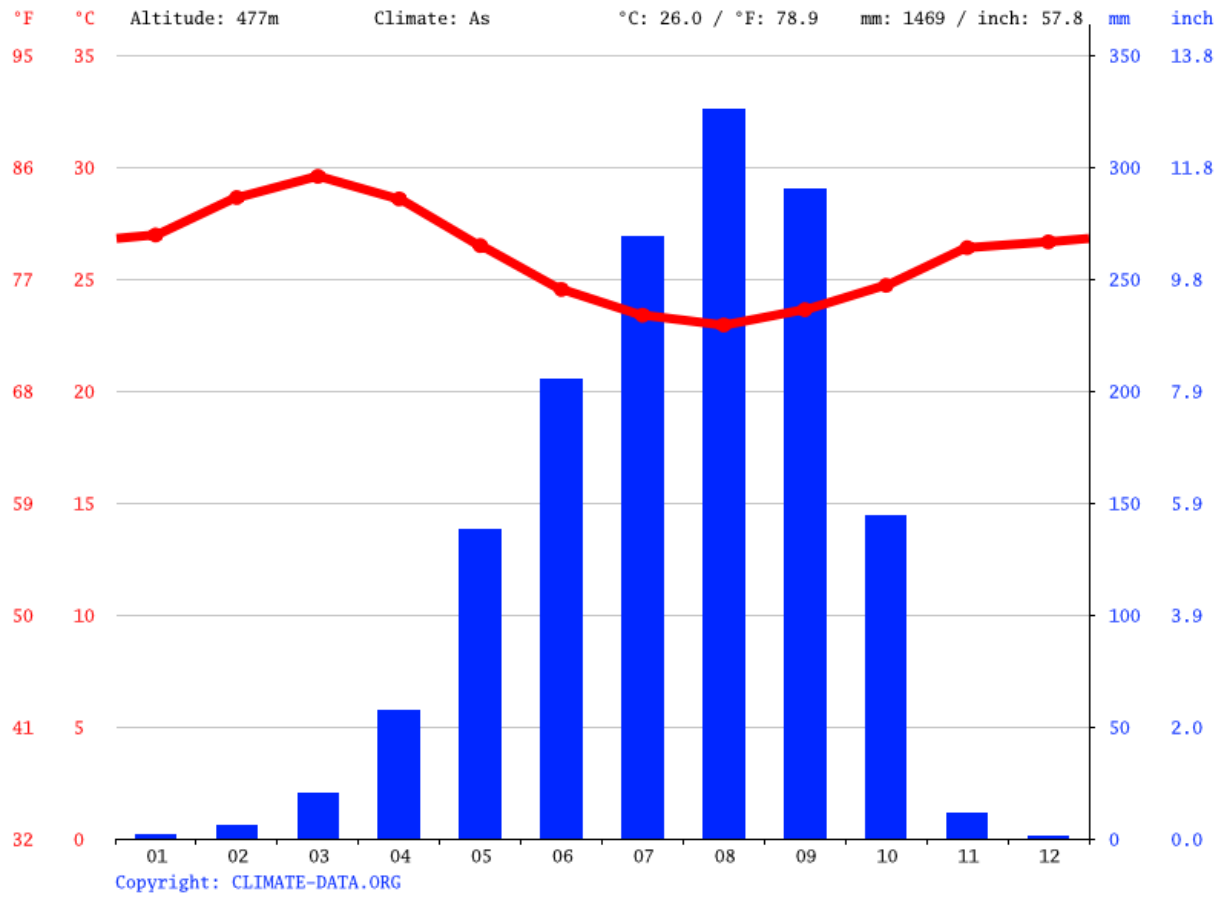
	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	27 °C (80.5) °F	28.6 °C (83.5) °F	29.6 °C (85.2) °F	28.6 °C (83.4) °F	26.5 °C (79.7) °F	24.5 °C (76.2) °F	23.4 °C (74.1) °F	22.9 °C (73.3) °F	23.6 °C (74.5) °F	24.7 °C (76.5) °F	26.4 °C (79.5) °F	26.7 °C (80) °F
Min. Temperature °C (°F)	20.5 °C (68.8) °F	22.3 °C (72.2) °F	23.8 °C (74.8) °F	24 °C (75.2) °F	23 °C (73.5) °F	21.7 °C (71) °F	20.9 °C (69.7) °F	20.7 °C (69.2) °F	20.8 °C (69.4) °F	21.3 °C (70.3) °F	21.1 °C (69.9) °F	20.4 °C (68.7) °F
Max. Temperature °C (°F)	33.6 °C (92.4) °F	34.9 °C (94.9) °F	35.5 °C (96) °F	33.8 °C (92.8) °F	30.6 °C (87.2) °F	28.2 °C (82.7) °F	26.8 °C (80.3) °F	26.2 °C (79.2) °F	27.6 °C (81.6) °F	29.1 °C (84.4) °F	32 °C (89.5) °F	33.2 °C (91.7) °F
Precipitation / Rainfall mm (in)	2 (0)	6 (0)	20 (0)	57 (2)	138 (5)	205 (8)	269 (10)	326 (12)	290 (11)	144 (5)	11 (0)	1 (0)
Humidity (%)	26%	29%	38%	57%	73%	82%	85%	87%	85%	80%	51%	29%
Rainy days (d)	1	1	3	7	14	17	21	21	20	15	2	0
avg. Sun hours (hours)	10.3	10.3	10.0	8.3	6.1	4.5	4.3	3.9	4.6	6.3	9.8	10.3

Source: NIMET Data,

Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours.

There is a notable variation in precipitation levels between the driest and wettest months, amounting to 325 mm | 13 inch. Throughout the year, temperatures vary by 6.6 °C | 12.0 °F.

The month with the highest relative humidity is August (86.72 %). The month with the lowest relative humidity is January (26.36 %). The wettest month is



August (28.27 days). The driest month is December (0.23 days).

Figure 4.2 Climate Graph // Weather by Month Abuja

The month with the least amount of precipitation is December exhibiting a mere 1 mm / 0.0-inch rainfall. Most of the precipitation here falls in August, averaging 326 mm / 12.8 inch.

Temperature

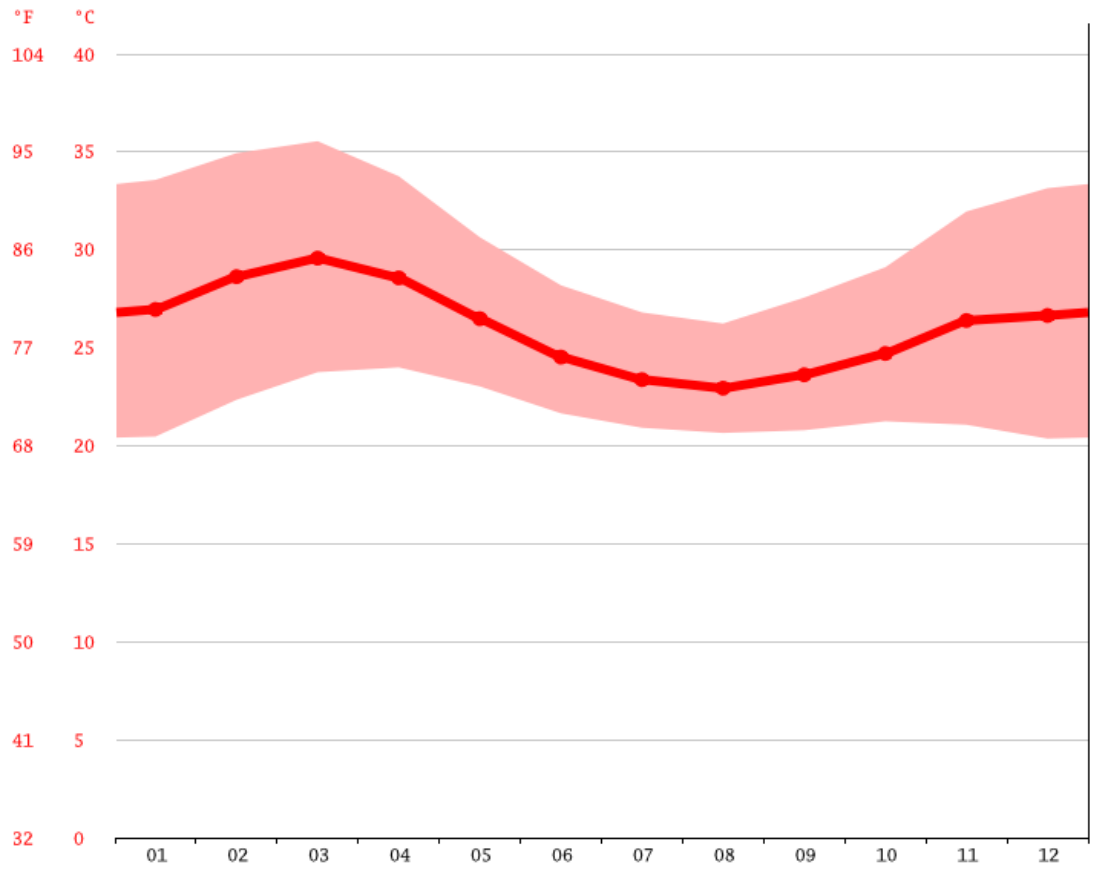


Figure 4.3 Average Temperature by Month Abuja

The month of March boasts the highest average temperature, with a recorded maximum of 29.6 °C | 85.2 °F. August is the coldest month, with temperatures averaging 22.9 °C | 73.3 °F.

Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Abuja experiences *extreme* seasonal variation in monthly rainfall.

The *rainy* period of the year lasts for *8.2 months*, from *March 8* to *November 13*, with a sliding 31-day rainfall of at least *0.5 inches*. The month with the most rain in Abuja is *August*, with an average rainfall of *9.8 inches*.

The *rainless* period of the year lasts for *3.8 months*, from *November 13* to *March 8*. The month with the least rain in Abuja is *December*, with an average rainfall of *0.0 inches*.

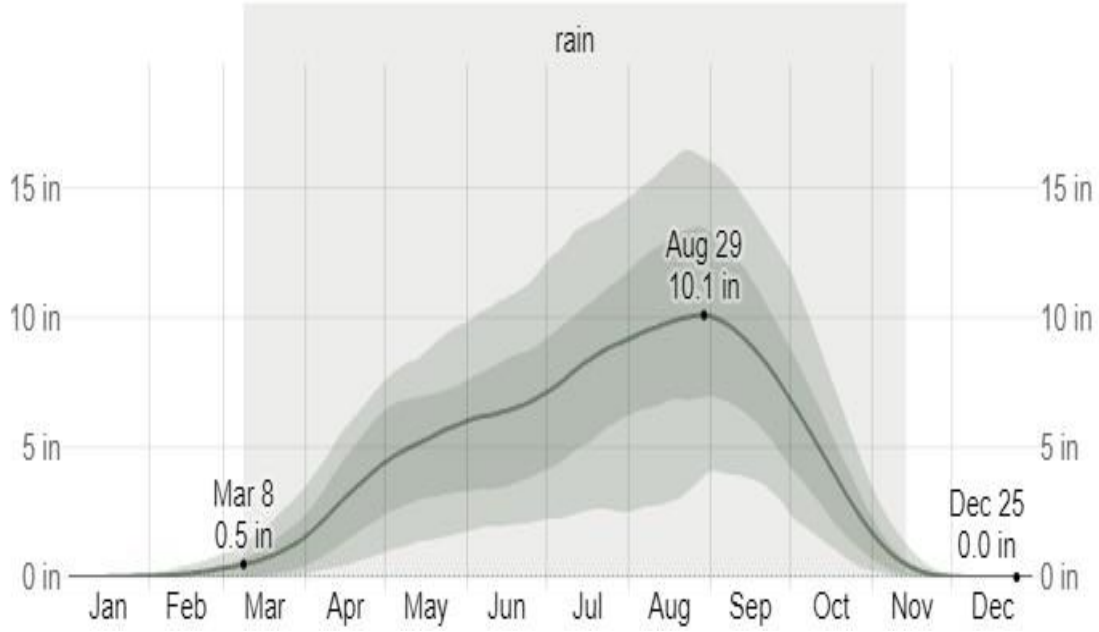


Figure 4.4 Average Monthly Rainfall in Abuja

Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Abuja experiences *extreme* seasonal variation in the perceived humidity.

The *muggier period* of the year lasts for *9.0 months*, from *February 22* to *November 21*, during which time the comfort level is *muggy*, *oppressive*, or *miserable* at least *27%* of the time. The month with the muggiest *days* in Abuja is *August*, with *31.0 days* that are *muggy* or worse.

The month with the fewest *muggy days* in Abuja is *January*, with *1.8 days* that are *muggy* or worse.

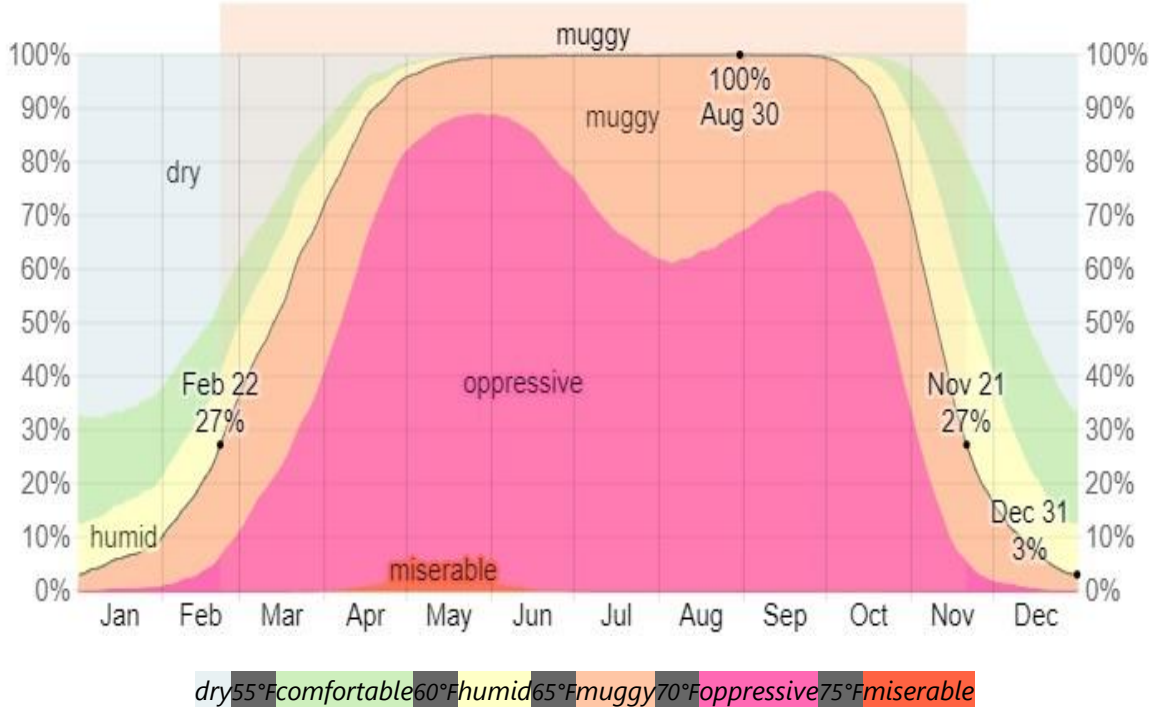


Figure 4.5 Humidity Comfort Levels in Abuja

4.6 Vegetation and Wildlife

The FCT falls within the Guinean forest-savanna mosaic zone of the West African sub-region. Patches of rain forest, however, occur in the Gwagwa plains, especially in the rugged terrain to the southeastern parts of the territory, where a landscape of gullies and rough terrain is found. These areas of the Federal Capital Territory (FCT) form one of the few surviving occurrences of the mature forest vegetation in Nigeria.

The dominant vegetation of the territory is classified into three savannah types, as follows:

Park or Grassy Savannah: This occupies about fifty-three percent of the total area of the FCT. It is annual in nature and only a few trees are found among the just grasses, namely, Albiza, Zygia, Butrospermum paradoxum, Daniellia olively and parkia clapperfoniana.

Savannah Woodland: This cover (here about 12.85 percent of the total area and occurs mostly in the rugged and less accessible parts of the territory, especially in the Gurara, Robo and Rubochi half plains and surrounding hills. The commonest tree species found include Afzela hen africana, Anogeissus leicarpus, The Buttyroscarpus paradoxum, Daniellia tive oliveri, Kyaya senegalensis, Prosophis rigi africana, Uapaca tonoensis, Albiza spp., rom Vitex doniania, Bombax costatum and non-Pterocarpus erinaceus.

Shrub Savannah: Occurs extensively in rough terrain close to hills and ridges in all parts of the territory, and cover about 12.9 per cent of the total area. Specie composition varies extensively.

Table 4.5 Plants Species

S/No	Plant Species	Common Name	Family	Habit	Ecological Significant / Conservation Status/Abundance
1	*Andropogon pseudapricus*	Gamba*	Gramineae	Herb	Very common
2	*Aristida longiflora*	Feather-Top Wire grass	Gramineae	Herb	Very common
3	*Artemisia tridentate*	Sagebush	Gramineae	Herb	Very common
4	*Ascolepis protea*	Sedges	Cyperaceae	Herb	Common
5	*Arachis hypogaea*	Groundnut	Leguminosae	Herb	Common
6	*Amarathus hybridus*	Aleyafu*	Amaranthaceae	Herb	Common
7	*Anacardium occidentale*	Cashew	Anacardiaceae	Tree	Very common
8	*Afzelia African*	Kawo*	Caesalpiniaceae	Tree	Few
9	*Acacia albida*		Misosaceae	Tree	Very common
10	*Acada Arabica*	bagaruwa	Misosaceae	Tree	Very common
11	*Adenodelicho s paniculatus*	Kwiwa*	Misosaceae	Herb	Common
12	*Acanthospem um hispidum*	Kashin yawo*	Compositae	Herb	Few
13	*Butyrospemum parkii*	Shea butter Tree	Sapotaceae	Tree	Common
14	*Brachiaria decumbers*	Creeping signal grass	Gramineae	Herb	Common
15	*Bulbostylis abortive*	Sedge	Cyperaceae	Herb	Common
16	*Bulbostylis filamentosa*	Sedges	Cyperaceae	Herb	Common
17	*Crossopteryx febrifuga*	African Bark	Rubiaceae	Tree	Common
18	*Crotalaria retusa*	Devils Bean	Leguminosae	Herb	Common
19	*Citrus sinensis*	Sweet Orange	Rutaceae	Herb	Very Common
20	*Cyperus rotundus*	Sedges (nutgrass)	Cyperaceae	Herb	Common

21	*Carica papya*	Papaya (Pawpaw)	Caricaceae	Tree	Few
22	*Cassia tora*	Tafasa*	Compositeae	Herb	Common
23	*Danielia oliveri*	Chiha	Leguminosae	Tree	Few
24	*Elaeophorbia grandifolia*	Olive-Euphoribia	Euphorbiaceae	Tree	Common
25	*Glycine max*	soyabeans	Leguminocea	Herb	Very Common
26	*Hyparheria Rufa*	Thatching Grass	Gramineae	Herb	Common
27	*Hibis us Sabdarifa*	Yakuwa*	Malvaceae	Herb	Common
28	*Hibisus Esculantus*	Okra	Malvaceae	Herb	Common
29	*Imperata Cylindrical*	Tofa*	Gramineae	Herb	Few
30	*Lophira*	Ochnacae	Ochnacae	Tree	Common
	Lanceolata				
31	*Lycopersicum Esculentum*	Tomato	Solanaceae	Herb	Common
32	*Mariscus dubius*	Sedges	Cyperaceae	Herb	Common
33	*Manihot esculanta*	Cassava	Euphorbiaceae	Shrub	Common
34	*Mangifara indica*	Mango	Anacardiaceae	Herb	Common
35	*Oryza sativa*	Rice	Gramineae	Herb	Very Common
36	*Pennisetum pedicelatum*	Kyasuwa*	Gramineae	Herb	Very abundant/ Common
37	*Pennisetum purpureum*	Elephant Grass	Gramineae	Herb	Common
38	*Sesamum indicum*	Beniseed	Pedaliaceae	Herb	Very Common
39	*Piper nigrum*	Pepper	Solanaceae	Herb	Common
40	*Psidium guajava*	Guava	Myrtaceae	Tree	Common
41	*Paspalum orbiculare*	Brownseed Paspalum	Mimosaceae	Herb	Common
42	*Parkia biglobosa*	Locust Bean Tree	Fabaceae	Herb	Common

43	*Piliostigma thonningii*	Thonning's piliostigma	Caesalpiniceae	Tree	Very Common
44	*Prosopis afriana*	Kiriya	Leguminosae	Tree	Few
45	*Setaria sphacelata*	Setaria	Gramineae	Herb	Very Common
46	*Setaria*	Pale setaria	Gramineae	Herb	Common
	palidefusca				
47	*Sporobolus pyramidlis*	Pyramid Dropseed	Gramineae	Herb	Common
48	*Sorghum vulgare*	Guinea corn	Gramineae	Herb	Common
49	*Saccharum officinarum*	Sugar cane	Gramineae	Herb	Common
50	*Solanum melongena*	Egg plant	Solanaceae	Herb	Common
51	*Striga hermonthica*	witchweed	Orobanchaceae	Herb	Common
52	*Scleocaprya birrea*	Danya	Anacardiaceae	Tree	Very Common
53	*Terminalia superb*	Superb terminalia	Combretaceae	Tree	Very Common
54	*Tectona grandis*	Teak	Lamiaceae	Tree	Few
55	*Terminalia laxiflora*	Farin Baushe	Combretaceae	Herb	Very Common
56	*Zea mays*	Maize	Gramineae	Herb	Common
57	*Vigna unguiculata*	Cow Pea	leguminoseae	Herb	Common

4.6.1 Economic Plant Species

Table 4.6 gives the economic plants/crops in the project Area. Farming is the main occupation of the people of the area. Many decades of farming, grazing, hunting and fire wood exploitation have resulted in the disappearance of the primary vegetation. Maize, Yams, rice, guinea corn, Cassava, Soyabeans, Benniseed are the dominant staple economic crops under cultivation. Infrastructural development, Farming, land fallowing and disturbance of the ecosystem, have lift most of the vegetation in a secondary form. This is attested to by the abundance and occurrence of weed species such as typha grass (*Typha latifolia*), *acanthospermum hispidum, and paspalum species, Hypperenia rufa, imperata cylindrica,*Cenchrus ciliaris, *Brachiaria, Tinthonia diversifolia, Lagenaria scicerania*

Table: 4.6 Economic Crops/ Plant Species within the area

S/N	Economic Crops / Plant Species
	EDIBLE FRUITS
1	*Mangifera indica (Mango)*
2	*Carica papaya (Pawpaw)*
3	*Psidium quajava (Guava)*
4	*Parkii clappertoniana(Locust bean)*
5	*Butyrospermum parkii (Shea butter)*
6	*Hibiscus esculantus(okra)*
7	*Lycopersicum esculentum(Tomatoes)*
8	*Solanum melongena (Egg Plant)*
9	*Piper nigrum(Pepper)*
10	*Anarcadium occidentale (Cashew)*
b.	*FOOD CROP*
	Zea mays (Maize)
	Vigna unguiculata (Cowpea)
	Arachis hypogaea (Groundnut)
	Manihot esculanta (Cassava)
	Oryza sativa (Rice)
	Sorghum vulgare (Sorghum or Guinea corn)
	Ipomoea batatas)Sweet Potato)

	Glycine max (Soybeans)
	Sesamum indicum (Beniseed)
c.	**SPICE AND STIMULANT**
	Piper nigrum(Pepper)
d.	**LEAVES / VEGETABLE**
	Amaranthus hybridus (Efo)
	Hibiscus sabdarifa(Yakuwa)
	Hibiscus esculantus (Okro)
	Lycopersicun esculentum (Tomato)
	Saccharum officinarum (Sugar cane)
	Solanum melongena (Eggplant)
	Parkia biglobosa (African Locust bean) dadawa
II	**House – Building Materials**
	Hyperhenia rufa
	Imperata cylindrical
	Lophira lanceolata (Ironwood)
III	OIL SOURCE
	butyrospermum parkii or Vitellaria paradoxa (shea butter) – the nut produces
IV	**HANDICRAFT**
	Terminalia superbe – source of Afara (Yoruba)
	Balanites eagyptiaca – the wood is used for making implements and
	Furniture
	Parkii clappertoniana – the tannin – rich bark is used in tanning, dying and
V	**MEDICINAL**
	Annona senegalensis – roots and bark have have medicinal value
	Balanites eagyptiaca – pulp of the fruit is medicinal and purgative and fish
	Vitex doniana; The flexible limbs of some sp are used in basket weaving. Some of the Aromatic Sp are used medicinally as mosquito repelallants
VI	**FUEL WOOD**
	All of the tree species
VII	**FIBRE / ROPE**
	Urena lobate
	Andansonia digitata – fibrous inner bark is used for making rope
VIII	**FODDER**
	All of the tree species and farm by-products.

4.6.2 Wildlife/Biodiversity

Wildlife

From the fieldwork exercise, wide ranges of wildlife species were observed. Table 4.7 below provides the list of wildlife including aquatic reptiles, birds and mammals in the study area. Frogs, toads and tadpoles were found almost everywhere in streams and peripheral of the project area. The skink and rainbow lizards were the only reptiles frequently sighted. The more common terrestrial birds sighted were coucal, black kite, barblers, swallows, hornbills, cattle egrets and doves. The lily-trotter was equally sited. The ground squirrel and bush mice were among the more frequently sited mammals in the area. Giant rat presence was recognized from their peculiar burrows and the grass cutter from recently eaten grass or Rice stems.

The table also gives the conservation status of the wildlife based on the categories in the international Union for the conservation of Nature (IUCN) now the World Conservation Union (WCU) and the Nigerian Endangered Species (control of international trade and traffic) Decree/Act. No. 11 promulgated in 1985. The act is in two schedules; *Schedule 1 contains a list of wildlife for which hunting capture of or trade in, is absolutely prohibited. Schedule 2 contains a list of threatened wildlif species which may be hunted or captured or traded on only under license*. None of the wildlife present was listed in the IUCN red list of threatened animals as at 2010 in any threatened category. The threatened are extinct, Endangered, Vulnerable, Rare, and Indeterminate. Among those listed in Act 11 'of 1985 are the black kite, shikra, royal python, Nile monitor, alligator or short nosed crocodile, pangoline and bush tailed porcupine are listed in schedule 1 and the hornbill egrets, monkeys bush baby, civet, genet and warthog are listed in schedule

The observations and interview conducted during the Wildlife survey carried out for amphibians, reptiles, birds and mammals has been evaluated. Specimens were identified using standard guides and manuals (Dyer, 1981; Serle *et el.*, 1984; Happold, 1987; Nason, 1992; Spawls, and Branch, 1997) and presented in the table below.

Means the species is not classified as endangered in IUCN threatened species categories or prohibited from international trade by CITES/Act 11,1985

Schedule 1 in the Nigerian Act 11,1985: list of absolutely prohibited wild life while Schedule 2 in Nigerian Act 11, 1985: List of wildlife that require permit before they can be involved in international trade.

Table 4.7 Wildlife check list

s/n	Animal Name	Family	Species Name	Common Name	Conservation Status
1	Amphibians frog	*Rhacophordae*	*Afrixalus dorsalis*	Tree frog	-
	Amphibian Frog	*Rhacophordae*	*Dicroglossus occipalis*	Long legged frog	-
	Toad	*Bufonidae*	*Bufo maculate*	African toad	-
		"	*Bufo regularis*	African toad	-
	Reptiles	*Scincidae*	*Mabuya blandingii*	Skink	-
2		*Agamidae*	*Agama agma*	Rainbow lizard	-
		Pythonidae	*Python sebae*	Rock python	-
		viperidae	*Bitis arietans*	Puff adder	-
		Elapidae	*Naja melanoleuca*	Black cobra	-
		"	*Naja nigricllis*	Spitting cobra	-
		Viperidae	*Bitis gabonica*	Gabon viper	-
		"	*Echis carinatus*	Carpet viper	-
		Varanidae	*Varanus niloticus*	Monitor lizard	1
		Elipadae	*Dendoaspis vividis*	Green mamba	-
			Grayia smythii	Water snake	-
			Kinixys erosa	Forest tortoise	-
3	Mammals		*Cricetomys gambianus*	Giant rat	-
		Thryonornyida	*Thryonomys swinderianus*	Giant Cane Rat	
			Lemniscomys sp	Bush mice	-
		Scuridae	*Xerus erythropus*	Ground squirrel	-
		Pteropodidae	*Epomops franquet*	Bat	2
		Bovidae	*Philatomba walteri*	Duiker (Antelope	-
			Rattus rattus	City rat	-
		Hystricidae	*Atherurus africanus*	Porcupine	1
	Bird	*Halcyonidae*	*Halcyon senegalensis*	Woodland king fisher	-

		Alcedinidae	*Alcedo cristata*	Malachite fisher	-
		Cisticolidae	*Cisticola cantans*	Singing Cisticola/bush – barbler	-
		Hirundinidae	*Hirrundo*	Barn swallow	-
		Hirundinidae	*Hirundo semirufa*	Rufous-chested swallow	-
		Cuculidae	*Centropus senegalensis*	Coucal	-
		Columbidae	*Streptopelia semitorquata*	Red eved dove	-
		Columbidae	*Streptopelia senegalenseis*	Laughing dove	-
		Columbidae	*Treron calva*	African Green pigeon	-
		Accipitridae	*Milvus migrans*	Black kite	1
		Accipitridae	*Accipiter badius*	Shikra	1
			Ploceus aurentius	Orange weaver	-
		Ploceidae	*Ploceus cucullatus*	Village weaver bird	-
		Pucnonotidae	*Pucnonotus barbatus*	Bulbul	-
		Jacanidae	*Actophilonis Africanus*	Lily-trotter	2
		Ardeidae	*Bubulcus ibis*	cattle egret	-
		Bucerotidae	*Lophoceros semifasciatus*	Hornbill	2
		Strigidae	*Ciccaba woodfordi*	Owl	-

Source: fieldwork, 2026

4.6.2.1 Invertebrates

Table 4:8 provides the identified species of invertebrate fauna present in the study area in both dry and wet seasons. The invertebrate fauna were the common and ubiquitous species. Some fauna was present in very high numbers (20-40) per 5m by 5m (25m^2) area such as the black ants, earth worms, wood lice while other were in very low numbers (1-5) per 25m^2, such as dragon and damsel files, bugs, crickets, butterflies and moths, cockroaches, beetles, mantids, stick insects, bees and wasps. Scorpions were very rarely seen although believed to be in existence. Present in high numbers but as many as the ants are grass hopers, millipedes and dipteran flies including blow files. Earth worms, woodlice were more abundant in the wet season.

Table 4.8 Checklists of invertebrate fauna in the project area

S/N	Animal Name	Species Name	Common Name
1	Files	*Musca domestica*	housefly
		Chironomus sp	Midge
		Culex, anopheles	Mosquitoes
		Simulium sp	Black fly
2	Dragon fly	*Bradinopyga strachan*	Dragonfly
3	Cricket	*Gryllotalpa Africana*	Mole cricket
4	Cockroaches	*Periplaneta americana*	Cockroach
5	Butterflv and moths	*Acrea sp. vreds sp. papilio*	Adults and caterpillars
6	Bugs	*Nzera viridula*	Sting bug
7	Beetles	*Melodeon downer*	Longicorn beetles
8	Bees	*Apis sp*	Bees
9	Ants	*Monomorium destructor*	Black ants
10	Scorpion	*Pandinus imperator*	Black scorpion
		Buthus hottentous	Light brown scorpion
11	Spiders	*Torania variata*	Jumping spider
12	Millipede	*Pachyiulus ligulatus*	Round, large
13	Grasshopper	*Zonocerus variegatus*	Short horn
14	Praying mantis	*Sphodromantis lineola*	Praying mantis
15	Termites	*Amitermis. cubiterm. macrotermis*	Termites
16	Wasps	*Polistes sp, vespa sp*	Wasps

4.7 SOIL

The soils of the territory are generally shallow and sandy in nature, especially on the major plains such as lku Gurara, Robos, and Rubochi. The high sand content particularly makes the soils to be highly erodible. The shallow depths reflect the presence of stony lower horizons. Those on the famous Gwagwa plains are however deep and clayey, perhaps reflecting the influence of parent materials like gabbro and fine to medium textured biotite granite.
Thus, the soils rich of the Gwagwa plains are the most fertile and productive soils. In addition, their being more or less formally exposed interfluve summits, makes them ideal for urban development. The FCT falls within the guinea savannah vegetation zone of Nigeria.

4.7.1 Soil Quality

Type, Structure, Color, Texture, Permeability/Porosity.
The soils are sandy-loam lateritic and usually occur in areas of long period of dry season. They are brown in color and have moderating degree of porosity. The soils were place on place the soil on munsell chart and arrived at 7.5YR $^{5/2 or 5/4}$ which determines the soil color. They are fine texture with little coarse sandy loam soils. Due to the accumulation of nutrients at the B-horizon as strongly influenced by the action of the parent materials. Thus, the soils support the cultivation of crops like yam, cassava, maize and guinea corn etc.

From the analysed samples, the following values were obtained, thus:

pH/ Conductivity

The pH is simply an expression of the concentration of hydrogen ions and most commonly measured parameter of soil characteristics. The pH measurements indicate the acidity, neutrality or alkalinity of a particular soil sample which gives useful information about the availability of exchangeable cations e.g. Ca^{2+}, Mg^{2+}, K^{+} etc.
From the analysed samples, the following values were obtained, thus:

The pH of soil samples from the study area as analysed ranges between 5.85 to 6.82.

The Electrical Conductivity of the soil samples ranged between 105 to 163µS/cm. They are within the tolerable limit of electrical conductivity for normal plant growth.

Oil & grease was below detectable limit in all the analysed samples.

The most important plant nutrient cations in soils are Phosphate, Sulphate, Chloride and Nitrates. Soils with more than 15% of cation exchange sites occupied by Na^+ are unfavorable for plant growth (Donahue, et al 1990). The values of sulphate, nitrate and chloride ranges as follows: Sulphate (32.53-46.60mg/kg); Nitrate (10.50-12.20mg/kg) and chloride (2.14-4.20mg/kg) respectively.

Heavy metals such as Manganese, copper, iron, zinc, cadmium, lead analysed and the values recorded are: Manganese-Mn (1.057-1.351mg/kg); Copper-Cu 2.502-3.491mg/kg); Iron-Fe (4.023-4.202mg/kg); Zinc (0.245-1.153mg/kg); Cadmiu-Cd (0.017-0.025mg/kg); Lead-Ld (0.003-0.009mg/kg); while Nickel-Ni (0.002-0.015) respectively.

The result of the analysis of basic soil parameters considered (table 4.9) indicates that the analytical values are all within the acceptable limits.

Table 4.9 Soil Sample Analytical Result

S/N	PARAMETERS	UNIT	JRB -SS1		JRB-SS1		JRB-SS3		JRB-SS4		JRB-SS5		FMEnv LIMIT
	GPS		9° 7'7.20"N 7°27'7.71"E		9° 7'8.89"N 7°27'8.11"E		9° 7'5.76"N 7°27'8.19"E		9° 7'10.57"N 7°27'6.21"E		9° 7'6.73"N 7°27'10.58"E		
			0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30	
A	PHYSIO-CHEMICAL TEST												
1	TEMERATURE	^{O}C	32.30	33.10	32.45	32.70	31.08	31.55	30.57	30.85	32.45	30.50	**<40**
2	pH	-	6.82	6.80	6.30	6.70	6.25	6.70	6.55	5.95	5.85	**5.89**	**6-9**
4	SOIL POROSITY	%	28.00	28.00	28.00	30.00	29.00	30.00	30.00	29.50	30.10	30.25	**NS**
	ELECTRICAL CONDUCTIVITY	µS/cm	114	143	126	116	132	163	132	118	127	105	
5	WET DENSITY	g/cm^3	1.190	1.290	1.120	1.170	1.057	1.170	1.170	1.13	1.175	1.067	**NS**
6	DRY DENSITY	g/cm^3	1.120	1.220	1.150	1.210	1.200	1.153	1.151	1.210	1.150	1.532	**NS**
7	BULK DENSITY	g/cm^3	1.130	1.112	1.250	1.150	1.097	1.155	1.137	1.150	1.203	1.100	**NS**
B	ORGANICS												
7	TOTAL ORGANIC CARBON	mg/kg	4.40	4.41	4.38	5.70	4.79	5.00	4.70	4.88	4.65	4.65	**NS**
C	EXCHANGEABLE IONS												
9	SULPHATE	mg/kg	46.60	46.60	46.55	42.71	32.53	32.53	40.34	40.52	41.63	43.00	**250**
10	NITRATE	mg/kg	12.20	12.17	11.33	11.54	11.53	11.62	10.89	10.76	10.50	10.78	**20**
11	CALCIUM	mg/kg	16.80	16.00	17.03	18.50	15.50	15.40	15.00	17.57	18.24	18.15	**150**
12	MAGNESSIUM	mg/kg	08.70	08.10	07.58	09.60	06.60	05.70	06.55	06.60	04.35	04.65	**50**
13	CHLORIDE	mg/kg	4.20	4.00	4.20	4.15	2.79	2.85	3.00	3.09	2.14	3.00	**NS**
14	POTASSIUM	mg/kg	14.55	14.12	14.50	12.34	13.04	12.54	12.55	10.15	11.33	12.14	**NS**
D	METAL/ HEAVY METALS												
15	MANGANESE	mg/kg	1.148	1.112	1.351	1.203	1.113	1.115	1.236	1.057	1.215	1.103	**1**
16	COPPER	mg/kg	3.763	3.542	3.037	3.491	3.021	3.370	3.451	3.171	2.502	3.313	**<1**
17	IRON	mg/kg	4.154	4.023	4.202	4.060	3.055	4.065	4.130	3.360	4.065	4.117	**1.5**
18	ZINC	mg/kg	1.010	1.000	1.010	0.994	0.245	0.731	0.814	0.524	1.153	0.735	**<1**
19	CADMIUM	mg/kg	0.024	0.021	0.023	0.021	0.025	0.021	0.023	0.020	0.017	0.020	**<1**
20	LEAD	mg/kg	0.009	0.009	0.009	0.006	0.004	0.006	0.003	0.006	0.003	0.005	**<1**
21	NICKEL	mg/kg	0.007	0.007	0.015	0.004	0.002	0.004	0.004	0.004	0.003	0.003	**<1**
22	CHROMIUM	mg/kg	0.587	0.547	0.5452	0.409	0.400	0.354	0.315	0.452	0.321	0.413	**<1**

Source: Field work Feb. 2026

4.8 GROUND WATER CHARACTERISTICS

4.8.1 Ground Water Quality

Ground water sample was collected from a borehole within the proposed project site. It was gathered that the ground water level is usually between 5-10 meters deep at the peak of the rainy season and between 15-20 meters deep in the dry season. At the time of the assessment, the ground water level was 16 meters deep. The physio-chemical analysis results of the ground water (borehole) are shown in table 4.10.

pH: The pH value recorded is 6.99 which shows that the ground water sample is neutral and normal.
Temperature: The temperature value for groundwater in the area is within normal with temperature of 30.4^0C;
The conductivity recorded is 106.0µs/cm.
TDS: Total dissolved solids (TDS) value recorded is 53.0mg/l.
TSS: Total Suspended Solids (TSS) for ground water is 0.010mg/l against the 10mg/l FME limits. However,
Oil & Grease: Oil/grease was not detected in the ground water.

Groundwater Heavy Metals
The heavy metal concentrations in ground water sample are generally low and within limit. Among the heavy metals analysed in ground water; Manganese (Mn) Iron (Fe), Copper (Cu), Cadmium (Cd), Zinc (Zn), Lead (Ld), and Nickel (Ni) were analysed have concentrations of Mn: 0.077mg/l; Fe: 0.318mg/l; Cu: 0.002mg/l; Zn: 0.064mg/l; Ld, Cd, Ni and Cr were not detected respectively.

Groundwater Microbiology
The microbiological characteristics of the ground water sources in the study are presented in table 4.8. The Total Coliform Count CFU/100ml is 2.7; ESCHERICHIO COLI (CFU/100ml is $19x10^2$ CFU/100ml; Solmonello (CFU/ml and Shigello (CFU/ml where absent while Entric (CFU/100ml was $3.3x10^2$ respectively.

Table 4.10 Physio-chemical parameters of Ground water Sample Analyzed

S/N	PARAMETERS	UNIT	GW	FMEnv LIMIT
			9⁰7′8.38″ N 7⁰27′8.93″ E	
A	**PHYSIO-CHEMICAL**			
1	TEMPERATURE	^{0}C	30.4	**<40**
2	pH		6.99	**6-9**
3	ELECTRICAL CONDUCTIVITY	µS/cm	106.0	**1000**
4	DISSOLVED OXYGEN	mg/l	6.10	**7.5**
5	TOTAL DISSOLVED SOLIDS	mg/l	53.0	**500**
6	SALINITY	%	0.00	**0.0**
7	TOTAL SUSPENDED SOLID	mg/l	0.010	**<10**
B	**CHEMICAL/ANION**			
8	TOTAL HARDNESS	mg/l	85.60	**200**
9	MAGNESIUM HARDNESS	mg/l	17.12	**50**
10	CALCIUM HARDNESS	mg/l	68.48	**150**
11	MAGNESSIUM ION	mg/l	4.12	**50**
12	CALCIUM ION	Mg/l	42.34	**100**
12	TOTAL CHLORINE	mg/l	16.11	**250**
13	NITRATE as NITROGEN	mg/l	0.324	**10**
14	BOD	-	-	**7.5**
15	COD	-	-	**30**
16	SULPHATE	mg/l	19.18	**500**
C	**METAL/HEAVY METAL**			
17	MANGANESE	mg/l	0.077	**0.2**
18	IRON TOTAL	mg/l	0.318	**1.5**
19	COPPER	mg/l	0.002	**0.1**
20	CADMIUM	mg/l	ND	**0.05**
21	ZINC	mg/l	0.064	**0.1**
22	LEAD	mg/l	ND	**0.05**
23	NICKEL	mg/l	ND	**0.05**
24	CHROMIUM	mg/l	ND	**0.05**

Sourced Geofteda Ventures Nig. Ltd. Field Survey, Feb. 2026

Table 4.11 Microbial Parameters Of Ground Water

S/N	SPECIE	UNIT	GW	FMEnv LIMIT
25.	*Total Coliform count*	*cfu/ml*	1.78	1.8
26	*Escherichia Coli*	*cfu/ml*	ND	**Absent**
27	*Salmonella*	*cfu/ml*	ND	**Absent**
28	*Shigella*	*cfu/ml*	ND	**Absent**
29	*Staphylococcus* spp	*cfu/ml*	ND	**Absent**

Key:
GW= Ground water
ND = Not Detected (which means the parameter was not detected)
NS = Not stated
mg/l = milligram per litre
µS/cm = micro-Siemens per centimeter
cfu/ml =colony forming unit per millimeter

4.9 AIR AND NOISE QUALITY

Air pollution is a major health problem affecting developed and developing countries around the world. Increasing amounts of potentially harmful gasses and particles are being emitted into the atmosphere on a global scale resulting in damage to human health and the environment. Air pollutants could result from stationary and mobile sources. Stationary sources include; agricultural production, mining, manufacturing of chemicals, power generation, community sources (e.g. heating of homes and buildings – most especially in temperate zones), municipal waste and sewage sludge incinerations, fireplaces, cooking facilities etc.). While mobile sources comprise of any form of combustion engine vehicles.

4.9.1 Methods of Sample Collection and Analysis

The noise level, air pollution indicators and meteorological parameters were collected and analyzed in the month of February, 2026. Samples were collected at a height of between 1.5 to 2.0 meters above ground level at each of the sampling sites. Air quality analysis indicates that all the parameters are within the acceptable limits. The ambient air parameters considered (table 4.9) include but not limited to: Suspended particulate matter (SPM) and gaseous pollutants (Oxides of nitrogen (NO_x), oxides of sulphur (SO_x), oxides of carbon (Co_x) and hydrogen sulphide (H_2S) were measured within the study area to ascertain the air quality dispersion of the project environment and results presented in table 4.12. All parameters are within the FMEnv. acceptable limits.

NO_2 (Nitrogen dioxide)

Nitrogen dioxide (NO_2) is a red-brown pungent gas that is typically formed as a result of combustion processes. It is heavier than air with a vapour density of 1.58 compared to 1.0 for standard air. It combines with water to form nitric acid (HNO_3) and nitric oxide (NO). Nitrogen dioxide is toxic to various animals as well as to humans. Its toxicity relates to its ability to form nitric acid with water in the eye, lung, mucus membrane and skin. Laboratory studies show susceptible humans such as asthmatics exposed to high concentrations of NO_2 can suffer lung irritation and potentially, lung damage.

NO_2 was detected in three sampling points with value of 0.01ppm which shows clean air in the area considering the allowable limit of 0.04-0.06 set by FMEnv for Nigerian environment.

Table 4.12 Air Quality Measurements

Parameters			H_2S	CO	NO_2	NH_3	SO_2	CH_4	Dust		Noise	R/H	Temp	W/speed
Units	**Location**	**GPS Coordinates**	**ppm**	**ppm**	**Ppm**	**Ppm**	**ppm**	**ppm**	**Pm 2.5 µg/m³**	**Pm 10 µg/m³**	**dB(A)**	**%**	**⁰C**	**Km/hrs**
AQ1	Within Site central 1	9° 7'7.39"N 7°27'8.08"E	0.00	0.0	0.00	0.00	0.00	0.00	35	93	45.0	40.2	30.0	1.4
AQ2	Within Site North	9° 7'9.06"N 7°27'8.41"E	0.00	1.0	0.01	0.00	0.02	0.00	30	89	46.8	40.4	30.4	1.0
AQ3	Within site south	9° 7'5.97"N 7°27'7.96"E	0.00	1.0	0.00	0.00	0.01	0.00	28	90	53.5	40.3	30.3	2.2
AQ4	South out of site 1	9° 7'5.20"N 7°27'6.81"E	0.00	0.0	0.00	0.00	0.01	0.00	34	95	50.6	40.5	30.0	1.8
AQ5	South out of site 2	9° 7'5.29"N 7°27'9.84"E	0.00	0.0	0.00	0.00	0.00	0.00	32	91	61.2	40.0	32.3	1.3
AQ6	East out of site	9° 7'7.60"N 7°27'10.67"E	0.00	1.0	0.01	0.00	0.02	0.00	30	88	50.2	40.4	33.5	1-.8
AQ7	Control North of site	9° 7'11.41"N 7°27'7.96"E	0.00	1.0	0.01	0.00	0.01	0.00	27	86	40.8	40.0	33.0	2.3
AQ8	North	9°7'10.22"N 7°27'8.07"E	0.00	0.0	0.00	0.00	0.01	0.00	34	94	40.	40.2	33.4	3.5
AQ9	West of site	9° 7'8.16"N 7°27'4.05"E	0.00	0.0	0.00	0.00	0.01	0.00	32	90	53.5	40.2	33.6	2.6
AQ10	Control South	9° 7'3.23"N 7°27'8.03"E	0.00	2.0	0.01	0.00	0.02	0.00	34	97	63.4	40.3	33.8	2.8

Key: BDL-Below Detectable Limit; NS-Not Specify.

Source: Field Work (February, 2026)

Sulphur Dioxide (SO_2)

Sulphur dioxide (SO_2) is a colourless, water-soluble gas that is reactive and has a pungent odour. Sulphur dioxide is detectable to the human nose at concentrations of around 0.5–0.8 parts per-3 million (1400–2240 μgm). Concentrations of SO_2 in ambient air typically occur as a result of combustion processes, in particular the burning of high sulphur fuels, although specific industries such as fertiliser manufacturing also discharge SO_2. Sulphur dioxide is subject to a series of transformation processes in the atmosphere, which can result in, sulphurous and sulphuric acids, sulphites and sulphates being formed. SO_2 was detected with values between 0.01-0.02ppm.

Carbon Monoxide (CO)

Carbon monoxide (CO) is a colourless, odourless and tasteless gas that is a product of the incomplete combustion of solid, liquid and gaseous carbon-based fuels. Sources of carbon monoxide concentrations in ambient air are typically motor vehicle emissions and domestic home heating in most urban areas. CO was detected in five locations with values recorded 01 and 02ppm, an indication of the environment being free of pollutant to be compared with the 11.4ppm maximum limit of FMEnv.

Ammonia (NH_3)

Ammonia (NH_3) was not detected in all the sampling points.

Hydrogen Sulfide (H_2S)

Hydrogen Sulfide is a colorless gas with the characteristic foul odour of rotten eggs; it is heavier than air, very poisonous, corrosive and flammable. It often results from the bacterial breakdown of organic matter in the absence of oxygen gas, such as in swamps and sewers. This process is commonly known as anaerobic digestion. Hydrogen Sulfide was not detected in all the air monitoring points.

Volatile Organic Compounds (VOC's)

VOCs were not detected in all the sampling points.

Humidity

Hair Hygrometer with a range of 0 – 100% was used in measuring the humidity. The relative humidity measured is between 40.0 to 40.5%.

Temperature

The prevailing temperature was measured with a 4-in-1 environment meter with a range of 0 – 100^{O}C. The ambient temperature of the proposed project site area was between 30.0 and 33.8^{0}C.

Total Suspended Particulates Matter

Tiny airborne particles or aerosols that are less than 100 micrometers are collectively referred to as total suspended particulate matter (TSP). These particles constantly enter the atmosphere from natural and human sources. Human sources include: Motor vehicle use, Combustion products from space heating, Industrial processes, Power generation and dust releasing activities while natural sources include: Soil, Bacteria and viruses, Fungi, molds and yeast, Pollen and Salt particles from evaporating sea water. Minimum exposure limit for particulate matter according to the Nigerian standard is 250 μg/m^3. Total Suspended particulate is between 27.0 to 35.0 μg/m^3 for PM 2.5 and 86.0 to 97.0 μg/m^3 for PM 10, these values are far below the 250ug/m^3 maximum limit.

Noise

Noise is a collection of sounds in an environment in relation to its psychological effect on the receptors. Unpleasant sound can also be referred to as noise. Noise generation and reception vary from place to place. Average noise level recorded is between 40.0 to 63.4dB(A). These values are within the maximum limit of 90dB. All results are in μg/m^3 except otherwise stated. ND= Not Detected.

10.2 Socio-Economic Data Presentation

History

Katampe where the proposed project site is located, there is Katampe Main and Extension which are split by the Murtala Mohammed Expressway which links to the highway leading to Kaduna. Adjacent areas include Dawaki, Gwarinpa, Jahi, Kado, Mabushi, Maitama and Mpape.

Jahi Village claim host community of the proposed project site as land at katampe initially belong to the Jahi People. Jahi like other parts of AMAC and Bwari Area Council, is a Gbagyi community which have been in existence for over 55 years ago. Presently It is a cosmopolitan community as a result of the influx of people to the FCT in search of employment. The immediate

neighborhood of the proposed JRB Oil & Gas Limited is experiencing rapid infrastructural development of both commercial and residential uses.

Administrative set up:
The neighborhood is under the headship of the village head and it has no defined community development association due to its diverse nature.

Culture and Religion:
The neighborhood has no distinctive cultural festival that is being celebrated. The major religions in the area are Christians and Muslims.

Archeology:
There is no site of archeological interest in the neighborhood.

Age and Sex distribution of respondents; Demography: due to nature of the neighborhood, no information on the age/sex distribution of respondents and demography of the neighborhood were obtained,

Economy: Jahi consists of people from different works of life, ranging from trading, artisanship, public/civil service and farming. The indigenous Gbagyi people are predominantly farmers.
The major crops farming in the neighborhood is maize, beans, cassava, guinea corn and groundnut. Farmland in the area have been taken over by the land use and infrastructural development of the FCT

Existing infrastructures/social infrastructures
Infrastructural development around the proposed project site consists of residential and commercial development. No industrial set-up identified around the proposed project site.

Water supply, sanitation and waste management
The major sources of water supply in the neighborhood are from individual boreholes. The neighborhood is yet to be connected to municipal water supply (Pipe bone) water. The use of sachet water popularly known as pure water and

bottle water for domestic use. Most residence buy water from water vendors popularly known as mai ruwa.

The sanitary facilities in the neighborhood are the modern-day water closet system. Solid waste is managed by the Abuja Environmental Protection Board (AEPB) Waste management contractors. wastes are collected in designated waste bins for onward collection/disposal by the Municipal Waste management contractors.

Energy

Power supply in the area is through the Transmission Company of Nigeria (TCN) Line. Due to the irregular supply of power in around the area as it applies to other parts of the FCT and the nation at large, alternative sources of energy such as generators are used for lightening while gas and kerosene are alternative sources of power for cooking.

Banking

In terms of banking, no bank identified at the neighborhood. The nearest banks are found in in the area are in Maitama.

Transportation and communication

In terms of transportation, the means of transportation is mainly road transport. Jahi has been over the few years been transformed by the FCT infrastructural development in terms of roads and drainages. is connected through the Kubwa Express way. Access roads within Jahi are untarred earth road with poor drainage system. The neighborhood is connected with almost all mobile telecommunications network in country.

Health assessment

Various categories of health and medicals facilities exist in the FCT belonging to government, religious organizations and private individuals. Only private health clinics are found in Jahi village. Jahi people either goes to Bwari, Wuse, Gwarinpa or Maitama for healthcare services.

The common health problems in this community include the following: Malaria fever, typhoid fever, body pains and cough related problems.

Housing

It is a known fact that residential accommodation remains one of the most pressing needs of citizens in the FCT. The household types are the modern-day cement block houses and are roofed with aluminum roofing sheets. At Jahi village, most of the houses are made of mud bricks roofed with corrugated iron sheets.

Literacy level and Educational Facilities

There is Jahi LEA Primary school, no secondary school in the community. The children from the community goes to Kado where they attend secondary school.

4.10.3 Summary of Contributions, Suggestions and Concern Made by Respondents

The contributions made during consultation meeting and questionnaire administration around the proposed project site was summarized, thus:
The Gbagyi people appreciated the fact that the community was consulted to listened their views and concerned on the proposed JRB Oil & Gas Limited Petrol service station in their neighborhood.

- The welfare and comfort of the community and neighbors should be considered seriously by the developer.
- The environment and public health should be protected from degradation.
- Some of the respondents' express fears of accidents or disaster in the event of accident that may cause fire outbreak. They require that adequate measures should be put in place to avoid injury on the neighborhood. In addition, proper traffic control measures have to be put in place within and around the proposed project facility to avoid congestion of traffic and over rowdiness in the facility.
- The residents raised concern on the manner in which workers will be recruited into the company. They said that nepotism should not play a

major role in the recruiting process, noting that will shut out most residents. They proposed that open and competitive recruiting procedure to be followed and that the local residents to be given first priority. They noted that they need to benefit from a company such as the proposed project that will carry out its activity in their area by being employed in the company as opposed to a scenario where people from outside the neighborhood who may come to benefit.

- Company management to roll out an elaborate social responsibility projects (major concern of the neighborhood is access to good drinking water) so as the company to give back to society part of the profits that they are making from the same community they are operating in. In this manner, the wider respondents in the community will directly benefit from the company in a better and sustainable manner.
- Workers who will be working in the propose petrol station need to be protected against injuries, high noise and dust inhalation. Management to ensure that the systems are put in place to ensure the working environment is not dusty and noisy and appropriate PPE are provided to all workers and that the workers are trained on how to make use of the PPE for their own safety.
- Some respondents are of the opinion that during the project operation, the marketer should be consistent in selling, no hording for the purpose of black-marketing business or connive with those engages in black market business.
- The proposed project will ease accessibility to petroleum products to the neighborhood, and hence a welcome development.
- The only advice made was for the proponent who is the key player in the petroleum industry, should develop the site in such a way that safety of people in the area is considered.

Plate 4.4: Scoping Workshop with Representative of Stakeholders

Consultation with Representative of Chief of Jahi

Household Consultation

Plate 4.5: Walk-Through Consultation at Jahi

CHAPTER FIVE

ASSOCIATED AND POTENTIAL ENVIRONMENTAL IMPACTS

5.1 Overview

In this part of the report, some associated and potential impacts on the environmental component of land, water and air were identified and characterized. Although no adverse environmental impacts were identified since the site is yet to be developed as documented in the Preceding chapter on existing environmental status, it is important however to highlight areas where environmental components (land, air and water) can be adversely affected and include the following:

- Loss of vegetation, flora and fauna during site clearance.
- Oil spills during off-loading.
- Oil leakage from underground tanks.
- Spent oil dumping after car service.
- Solid wastes generation.

Emissions of gasses: Air quality may be affected through emissions of sulphur (IV) oxide, carbon (IV) oxide, carbon (II) oxide and volatile hydro-carbons (VHCs). The emission of these gases beyond acceptable limits has potential negative impact on air quality and can contribute to human health hazards and to both local and global environmental problems. The air quality parameters measured were found within the Federal Ministry of Environment acceptable limits.

An overview of the methodology adopted for assessment of project impacts as well as a summary of the associated and potential impacts of the proposed project on the environmental and socio-economic conditions of the project area is presented. The assessment of impacts is as comprehensive as possible, within the limits of available information.

These impacts were identified by examining the ways in which the activities associated with the different phases interact with the environment and its different components. The two key aspects of the proposed project (construction and operations) have several sub-components that can either directly or indirectly interact with different components of the environment leading to environmental issues. The assessment of the identified impacts was based largely on field observations, baseline data and existing literature. In practice, many elements of the environment are inter-related and cannot be considered in isolation. However, for convenience, some of these elements discussed here are under separate headings.

5.2 Screening of potential Impact and Methodology

The potential for an environmental and social impact exists where an environmental aspect has been identified i.e. where a project activity has been determined to have the potential to interact with the biophysical and socio-economic environment. The significance of each impact is then determined.

The methodology used for assessing the potential and associated impacts of the proposed JRB petrol filling station Project consists of five (5) major steps:

Step 1: Identification and description of project activities and their interaction (directly and indirectly) with the identified environmental and social receptors/resources within the Project site and its area of influence;

Step 2: Comprehensive preliminary identification of potential impacts as a result of cause-and-effect relationship;

Step 3: Comparative assessment of impact importance, identification of impacts that are likely to be significant through application of a basic set of impact significance criteria to the preliminary information available about each impact;

Step 4: Detailed assessment of the identified focus area impacts characterization techniques, quantification of impacts to the extent possible and rigorous qualitative characterization of impacts that cannot be quantified; and

Step 5: Final assessment of the severity levels of impacts through application of the results of the quantitative and qualitative characterization of impacts developed in Step 4 to a set of objective impact severity criteria; identification of impacts warranting mitigation and determination of residual impacts. The impact assessment process adopted for this EIA study is illustrated Figure 5.1

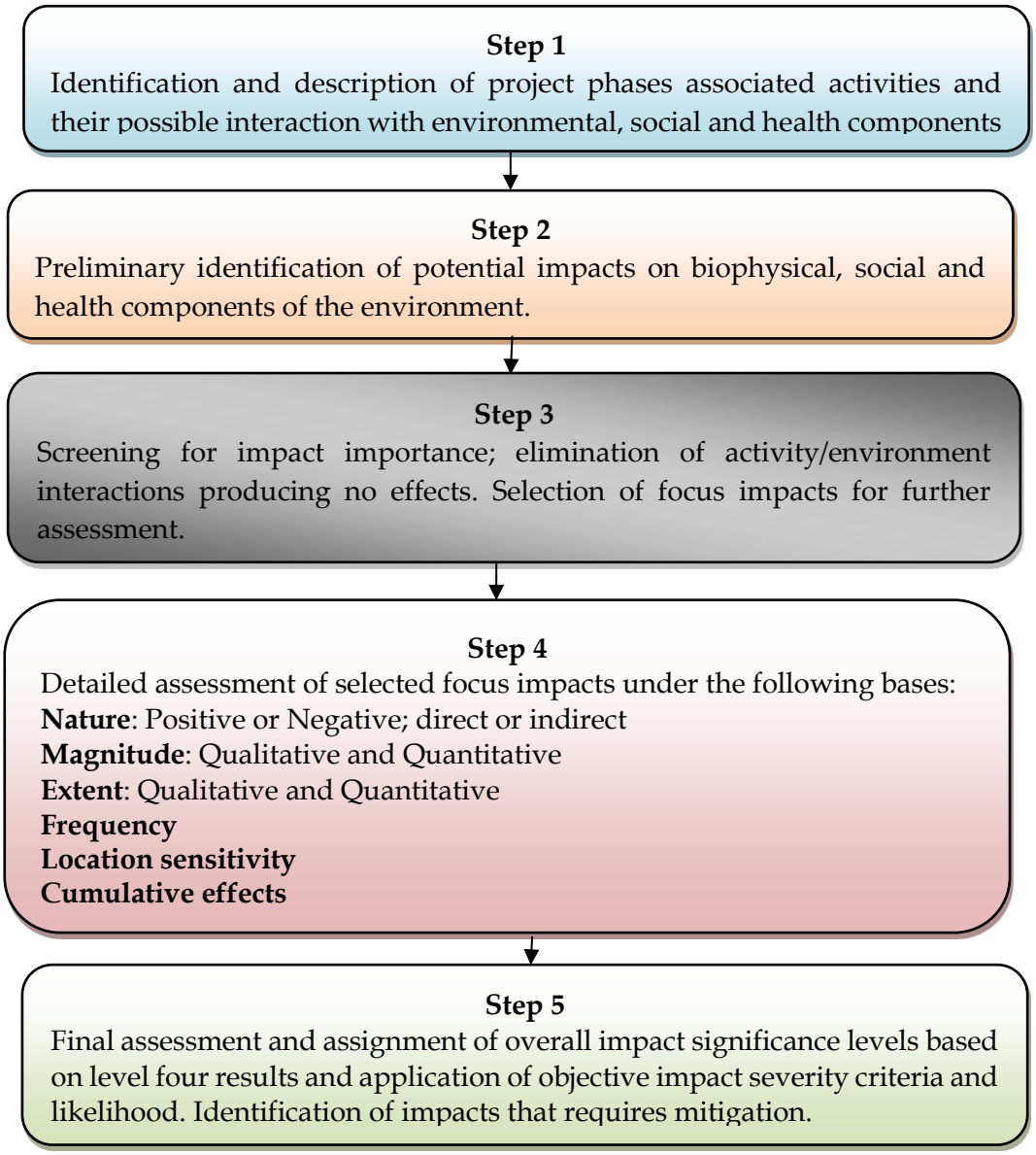


Figure 5.1 Overview of the Impact Assessment Process

The primary objectives of the impact assessment process are to:

- Establish the significance of identified potential impacts that may occur as a result of proposed Project activities.
- Differentiate between those impacts that are insignificant (i.e. can be sustained by natural systems) and those that are significant (i.e. cannot be sustained by natural systems).
- Apply mitigation measures for the identified significant impacts and assess residual impacts

In determining the significance of impacts, the factors considered include: magnitude of impacts (which is a function of the combination of the following impact characteristics: **extent**, **duration**, **scale**, and **frequency**); and value/sensitivity/fragility and importance of relevant environmental and social

receptors within the Project site and its area of influence. Relevant legal/regulatory requirements and public perceptions (based on stakeholder' consultations) are also considered.

The assessment of impact significance is both in qualitative and quantitative terms. Qualitatively, the impact significance is ranked on four (4) widely accepted levels: **Major**, **Moderate**, **Minor** and **Negligible.** These rankings are used for both biophysical and socio-cultural impacts.

The impact assessment covers the entire life cycle of the Project i.e.: pre-construction; construction; commissioning; operation; and decommissioning. Potential cumulative impacts as a result of the proposed JRB petrol filling station Project are also assessed.

5.3 Impact Prediction Methodology

Various impact prediction guidelines and methodologies have been developed and applied in various EIA activities. Internationally acceptable methods of impact prediction and evaluation include the following:

- Checklist (Canter, 1977)
- Interaction Matrix (Leopold *et al*., 1971)
- Overlays Mapping (McHarg, 1968)
- Networks
- Battelle Environmental Evaluation System (Dee *et al*., 1972).

The Leopold Interaction Matrix method, when compared to the other impact prediction techniques is simple, provides the same level of details, requires comparable knowledge of the environment and relies on limited data unlike the other methods that rely on availability of large historical data bank. A modified Leopold Interaction Matrix was thus adopted for the purpose of impact screening for this EIA.

5.4 Identification of Environmental and Socio-economic Aspects and Impacts

5.4.1 Definition of Environmental and Social-economic Aspects

The International Organization for Standardization's Environmental Management Systems (EMS), ISO 14001, defines an environmental aspect as: *"An element of an organization's activities, products or services that can interact with the environment."*

To identify environmental and social aspects of the Project, the planned project activities were considered in terms of their direct or indirect potential to:

- Interact with the existing natural environment including its physical and biological elements;
- Interact with the existing socio-economic environment; and
- Breach relevant policy, legal and administrative frameworks including national legislation, relevant international legislation/conventions, standards and guidelines, and corporate environmental policy and management systems.

5.4.2 Definition of Impacts

ISO 14001 defines an environmental impact as: *"Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services."* An environmental or socio-economic impact may result from any of the identified environmental aspects.

5.4.3 Potential Impact Characteristics

The criteria applied to the screening of various activities were:

i. Negative: An impact that is considered to represent an adverse change from the baseline or to introduce a new undesirable factor.
ii. Positive: An impact that is considered to represent an improvement to the baseline or to introduce a new desirable factor.
iii. Direct: Impacts that result from the direct interaction between a planned project activity and the receiving environment.
iv. Indirect: Impacts that result from other activities that are encouraged to happen as a consequence of the Project.
v. Short-term: Short term impacts are predicted to last only for a limited period but will cease on completion of the activity, or as a result of mitigation measures and natural recovery.
vi. Long-term: Impacts that will continue for the life of the Project, but cease when the Project stops operating.
vii. On-site: Impact that is limited to the Project site.
viii. Temporary/reversible: Temporary impacts are predicted to be of short duration, reversible and intermittent/occasional in nature. An impact that the environment can return to its natural state.
ix. Permanent/Irreversible: Potential impacts that may occur during the development of the Project and cause a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime. An impact that the environment cannot return to its original state, e.g. the extinction of an animal or plant species.

x. Cumulative: Potential impacts that may result from incremental changes caused by other past, present or reasonably foreseeable actions together with the Project.
xi. Residual: Both environmental and social impacts that will remain after the application of mitigation measures to Project impacts during each of the Project phases (pre-construction, construction, commissioning, operation, decommissioning).

5.4.4 Methodology for the potential Impacts Assessment.

In assessing the impacts of the proposed JRB petrol filling station project, the following information was used:

a. Knowledge of the proposed plant activities, equipment types, procedures, and abandonment programme,
b. The results of the environmental baseline studies (biophysical, socio-economic and health)
c. Findings of other EIA studies on similar areas and projects and other literature findings on the primary project activities,
d. Comparison with FMEnv/ UNEP/WHO/World Bank guidelines and standards,
e. Environmental audit reports (secondary data) on similar existing projects,
f. Series of resource persons (EIA Preparers) discussions,
g. Past experience on other EIA projects by the EIA preparers.

The various components of the proposed Plaster of JRB petrol filling station project that could have impacts on the biophysical, socio-economic and health environment of the project area were determined through an evaluation of the proposed project activities, the baseline of the project area that was reviewed, and the national/international legislative requirements. The activities of the proposed project with potential to have impacts on the environment include the following;

The project phases and its associated works essentially consist of:

Table 5.1 Summary of Project phases and associated activities

Phases	Activities
Pre-construction	• Pre-mobilisation/Project design • Clearing of vegetation and other debris • Construction of temporary store and workshop for construction works • Mobilisation of equipment and men to site • Transportation of materials
Construction	• Civil work activities • Construction of access roads and public utilities (sewage, power, water system) • On site fabrication of materials • Installation of equipment and machinery, • installation of ancillary facilities • Waste generation and disposal
Operation	• Operation of the petrol filling station • Operation and maintenance of the petrol filling station infrastructure and other facilities • Waste generation and management.
Decommissioning	• Removal of equipment and dismantling of structures • Site remediation and rehabilitation • Waste generation and disposal • Abandonment

The associated impacts indicators were identified and are listed in Table 5.2 below.

Table 5.2 Impactable Components and Associated Impact Indicators

Environmental Receptor	Comment	Impact Indicators
Physical		
Air Quality	Ambient air quality within the Project site and its area of influence	Increased concentration of gaseous and particulate pollutants (such as Dust, NOx, SOx, CO, VOC, PM10, PM2.5, CO2)
Noise and Vibration	Ambient noise and vibration level within Project site and its area of influence	Increased ambient noise and vibration level, night and day-time disturbance, hearing loss, communication impairment etc.
Soil	Soil environment within the Project site and its area of influence	Changes in physical, chemical and biological properties, loss of soil ecology and fertility, compaction, erosion etc.
Underground water/aquifers	Underground water resources within the Project site and its area of influence	Decrease in underground water/aquifer reservoir level, groundwater contamination, and availability of potable water.
Landscape/topography	The geomorphological land forms and terrain of the Project site and its area of influence	Alteration in drainage pattern, changes in landscape.
Biological		
Terrestrial Flora and habitats	Plant species within the Project site and its area of influence	Loss of terrestrial flora, introduction of new species.
Terrestrial Fauna including avifauna	Terrestrial fauna and avifauna within the Project's area of influence	Loss of terrestrial fauna; involuntary migration.
Socio-economic Environment		
Land use	Existing land use within the Project site and its area of influence	Loss of existing land value for other activities
Visual prominence	The aesthetic quality of the project on the surrounding visual catchment.	The compatibility of the of JRB petrol filling station project with the character of the locality.
Demography	Demography of communities in the Project's area of influence	Changes in total population, gender ratio, age distribution, socio-economic structure etc.
Utilities	The existing utilities (e.g. power supply, water,	Changes in existing utilities, damage to public utilities e.g. pipes, cables, road.

	sewerage services) in the Project's area of influence	
Infrastructure	The existing infrastructure such as road, waste handling facilities within the Project's area of influence	Damage to road infrastructure including road traffic; access to health facilities, communication facilities, or waste management facilities
Cultural values	Cultural sites within the Project's area of influence	Damage to cultural sites within the Project's area
Employment/income	The employment situation in the Project's area of influence	Opportunities for local and national employment; changes in income level
Other (Health and Safety)		
Construction workers	Workers' health and safety	Accidents, injury, fatality, exposure to nuisance (dust, noise), fire etc.
Workplace health and safety	The health and safety of employees involved with the plant operation.	Accidents, injury, exposure to nuisance (dust, noise), fire, explosion.
General public	Community health and safety	Exposure to road accident, fire, explosion, etc.

Likewise, the sources of probable impacts from the various stages of the proposed JRB petrol filling station project are also outlined in Table 5.3. below.

5.5 Impacts Identification

The anticipated associated and potential impacts of the proposed project activities on the biophysical, social and human health environment were identified based on the interaction between project activities and environmental sensitivities identified in the baseline (Table 5.4). The interactions among the environmental sensitivities were also considered for impact evaluation and categorization.

Identified Project activities and environmental and socio-economic receptors were integrated into a matrix with the Project activities on the y- axis and environmental receptors on the x- axis, and the matrix was completed for each of the project elements. The Leopold's Interaction matrix was subsequently assessed to identify every possible case of activity-receptor interaction Table 5.4. Using the above documentation, the checklist of potential/associated impacts for the project phases/activities of the project is presented in Table 5.5 below.

Table 5.3 Phases of Project Development Activities and Sources of Impact

S/N	Project Phases	Activities and sources of impact.	Impacts
1.	Pre-construction	Mobilization of personnel and equipment to proposed project Site.	• Increased ambient noise level due personnel and vehicular movement. • Increased pressure on existing infrastructures. • Increased social vices.
		Clearing of the vegetation	• Injuries/incidents from wildlife attacks and equipment use. • Migration of wildlife. • Exposure of soil surface to; soil erosion, habitat fragmentation, soil compaction etc. • Increased potential for soil erosion due to run-off in raining season. • Attacks by snakes, insects and other wild animals.
2.	Construction	Construction works; excavations, Civil works, earth moving, asphalt etc. Wastes and Emissions Handling and Disposal	• Injuries/incidents from equipment use. • Soil, Air and noise pollution. • Employment generation. • Waste generation.
3.	Operation	Petrol filling station operations and maintenance etc. Wastes and Emissions Handling and Disposal	• Pressure on existing infrastructures. • Increased social vices. • Socio-economic increase. • Waste generation/management. • Soil, Water and Air Pollution
4.	Decommissioning	Demobilization of equipment and workers, Dismantling of structures and restoration/rehabilitation site after project lifespan.	• Loss of revenue for both state and federal government. • Loss of jobs. • Increased social vices.

Table 5.4 Screening Matrix for Potential Biophysical and Social Impacts

Table 5.4: Screening Matrix for Potential Biophysical and Social Impacts:

PROJECT ACTIVITIES	Environmental and Social Impact Indicators															
	Geology/Topography	Soil	Vegetation	Wildlife	Air quality	Vibration and Noise	Aesthetics	Groundwater	Population	Infrastructure	Macro and micro	Social and Cultural Structure	Physical and Economic Displacement	Cultural and Archaeological	Transportation	Education
PRE-CONSTRUCTION PHASE																
Physical Presence of Workers, Equipment and Materials on Site	1	1	1	1	1	1	1	1	1	1	1	1	1+	1	-	-
Transportation of Workers and Materials	-	1	-	1	1	1	-	-	1	-	1+	-	1+	-	1+	-
Physical Site Clearing	1	1	2	2	1	1	-	-	-	-	1+	1	1	1	1	1
CONSTRUCTION PHASE																
Construction Works; Excavation, Civil works and asphalting etc.	1	1	1	-	1	1	1	1	1	1	1+	1	1	1	1	1
Wastes and Emissions Handling and Disposal	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-

Table 5.4: Screening Matrix for Potential Biophysical and Social Impacts:

PROJECT ACTIVITIES	Environmental and Social Impact Indicators															
	Geology/Topography	Soil	Vegetation	Wildlife	Air quality	Vibration and Noise	Aesthetics	Groundwater	Population	Infrastructure	Macro and micro	Social and Cultural Structure	Physical and Economic Displacement	Cultural and Archaeological	Transportation	Education
OPERATION PHASE																
Petrol filling station Operations	-	1	-	-	2	2	2	1	1	+	+	-	+	-	-	+
Wastes and Emissions Handling and Disposal	-	1	-	-	2	2	1	1	1	1	+	-	-	-	-	-
DECOMMISSIONING PHASE																
Removal of Installed Facilities	1	1	1	1	1	1	2	1	-	-	1+	-	1+	-	1+	-
Wastes and Emissions Handling and Disposal	-	1	1+	-	1	1	-	1	-	-	1+	-	1+	-	1+	-

Table 5.5 Associated and Potential Impacts of The Proposed Project

Project Phase	Project Activities	Environmental/Socio-economics Aspect	Potential/Associated Impacts
PRE-CONSTRUCTION	Land acquisition	Socio-Economics	• Community agitation over compensations, land disputes, wrong stakeholder identification, leadership tussles etc • Increased income generation. • Increased incidence of Intra and Intercommunity conflicts.
	Employment of skilled and unskilled labour	Socio-economics	• Creation of employment for skilled and unskilled workforce. • Skill acquisition and enhancements to local indigenes and workforce. • Business opportunities for local contractors through sub-contracting activities • Conflicts/community agitations over employment issues (quota and methods)
	Construction of site store and office, access roads and mobilization of equipment	Air Quality/Noise	• Increase of dust particles and vehicular emissions Nuisance (noise and vibrations) due to movement from heavy duty equipment and vehicles affecting site workers

	Movement of personnel to site.	Socio-Economic	• Increased pressure on housing and other amenities/ existing social infrastructure. • Increased cost of living due to inflation arising from increase in demands. • Increased traffic during mobilization on road with risk of accidents leading to injury/death and loss of asset. • Security issues; Risk of unknown gun men attack and hostage taking leading to injury/death of personnel. • Abandonment of traditional occupations, alterations of religion, gender and age balance. • Disruption of family life, divorces, increase in school-drop out. • Increase in incidence of intra-and inter-community conflicts.
		Health	• Increase in social vices (prostitution, unwanted pregnancies, abortions etc.) resulting from increased number of people. • Increased pressure on health facilities and cost of health care services. • Increased cases of school drop-outs, disruption of family life (divorces).

			• Increase of communicable diseases due to influx of people. • Increase in sexually transmitted diseases e.g. HIV/AIDS, STI
		Waste/Environmental Aesthetics	• Reduction in environmental aesthetics value due to indiscriminate deposition of construction site office associated wastes.
	Clearing of vegetation and other debris	Vegetation	• Loss of vegetation in the project site area. • Loss of habitat for wildlife
		Soils	• Exposure of soil surface to the elements that can trigger erosion. • Soil degradation e.g. compaction of soil as a result of the movement of earth moving equipment • Exposure of soil surface to wind and sheet erosion.
		Human Health	• Injuries from wildlife attacks (snakes bites and insects stings). • Injuries from machete and other equipment during vegetation clearing.
		Flora and Fauna	• Flora/habitat loss and disturbance through vegetation clearing and earthworks within project site and access road. • Loss of individual or localized population of fauna

			• Loss of wildlife habitat and emigration of wildlife.
CONSTRUCTION	Civil works activities such as construction of buildings, canopies over the dispensing pumps island, excavation of underground storage tanks pits, Equipment installations, Installation of ancillary facilities, Installation of electricity power infrastructure etc	Socio-Economics	• Employment of local labor and skills acquisition for workers taking advantage on new opportunities. • Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting • Increase in revenue opportunities for local population due to presence of non-resident workers and travelers. • Increased cost of living due to inflation arising from increased demands.
		Human Health	• Workplace accidents from burns, cuts, bruises, trips and falls, object at height leading to injury of fatalities. • Risks injury/death and loss of assets resulting from accidents associated with road transportation to and fro construction sites • Inhalation by onsite workers of spm and other toxic fumes during foundation works and welding of material components

			• Traffic congestion during transportation of demobilized equipment and personnel • Potential collapse of buildings/structures on land as a result of unstable geotechnical conditions • Restriction of access roads to prevent unauthorized uses.
		Flora and Fauna	• Reduction in wildlife population as a result of poaching due to easier access created by project site clearing. • Noise nuisance (including impulsive noise) from construction activities, resulting to temporal migration of sensitive mammals and rodents
		Groundwater	• Groundwater contamination resulting from accidental leakages and spill of hazardous substances (diesel, lubricants, hydraulic oil etc)
		Air quality/Noise	• Generation of dust and automobile/heavy duty equipment emissions. • Decrease in air quality as a result of emissions from vehicles and equipment. • Increased ambient noise level from heavy equipment and machinery, vehicular movement, and civil work activities.

		Waste/Environmental Aesthetics	• Reduction in environmental aesthetics value due to indiscriminate disposal of wastes. • Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks
		Soil	• Soil degradation and possibly accelerated erosion • Reduction in structural stability and percolative ability of the soil. • loss of soil dwelling organisms
OPERATION	Operation and maintenance of the Petrol Filling Station	Human Health	• Injuries/fatalities of personnel due to road accidents during facility inspection and checks • Explosion and fire hazards at the facilities.
		Air quality/Noise	• Emission from equipment and machines in the plant • Increase in noise level during operation hours.
		Socio-Economics	• Increased business opportunities and quality of life (small, medium and large scale) • Unchecked encroachment on the project site, leading to land-use conflicts and accident • Enhanced aesthetic appeal due to presence and eventual operation of many facilities in the project site

		Fauna	• Injury/ mortality of birds due to collision with wires around the project area. • Fauna disturbance and displacement as a result of migration away from activity area (this includes impacts on birds)
Decommissioning and Abandonment	Demolition of buildings, Site remediation and rehabilitation	Socio-Economic	• Loss of employment • Availability of land for alternative uses
		Air quality/noise	• Increased noise level • Generation of dust and automobile/heavy duty equipment emissions.
		Human and Health	• Risk of accident and injury to workers during demolition of structures • Traffic obstruction from transportation of decommissioned structures and equipment

5.6 Impacts Quantification, Determination and Ranking

The identified potential and associated impacts of the proposed project were quantified using the Risk Assessment Matrix (RAM) and the International Standard Organization (ISO) 14001 criteria for identifying and quantifying environmental aspects /impacts.

The following are the ISO 14001 based criteria and ratings for identifying significant environmental impacts of the proposed project.

LEGAL/Regulatory Requirements (L)

Is there legal/regulatory requirements, or permit requirement?

0 = There is no legal/regulatory requirement
3 = There is legal/regulatory requirement
5 = There is a permit required

RISK (R)

What are the Risk/ Hazard rating based on Risk Assessment Matrix?

1 = Low Risk
3 = Medium/Intermediate Risk
5 = High Risk

Environmental Impact Frequency (F)

What is frequency rating of impact based on RAM?

1 = Low Frequency
3 = Medium/Intermediate Frequency
5 = High Frequency

Importance of Affected Environmental Component and Impact (I)

What is rating of importance based on consensus of opinion?

1 = Low Importance
3 = Medium/Intermediate
5 = High Importance

Public Perception (P)

What is the rating of public perception and interest in proposed project and impacts based on consultation with stakeholders?

1 = Low Perception and Interest
3 = Medium/Intermediate perception and interest
5 = High Perception and interest

The significant potential impacts of the project activities were identified as those impacts outlined in Table 5.4.

Impacts Weighting:

The total weighting of L+R+F+I+P is 25

The benchmark for impact quantification for this study is as follows;

If the sum of **L+R+F+I+P = <10,** then the impact is rated **LOW**

If the sum of **L+R+F+I+P is between10-17,** then the impact rating is **MEDIUM**

If the sum of **L+R+F+I+P is >17,** then the impact rating is **HIGH**

Table 5.6 The Risk Assessment Matrix (RAM)

		Severity				
Likelihood		Minor injuries/ not detectable	First Aid Injury/ short term	3-day injury temporary disability/ prolonged but recoverable impact	Major injury/Long term absence/ Prolong impacts	Fatality/ catastrophic
PROBABILITY	Remote possibility /rare	1	2	3	4	5
	Might happen/ unlikely	2	4	6	8	10
	Feasible/ moderate	3	6	9	12	15
	Highly probable/ likely	4	8	12	16	20
	Invariably happen/most certain	5	10	15	20	25
	Scale					
	+	0	Low	Moderate	High	
	Decisions and nature of actions					
	Rating		**Definition**			
	11-25	H	Unacceptable risk, action required, Risk reduction required – High priority, High Impact – Senior management involvement and planning needed.			
	6-10	M	Medium risk – action required so far as is reasonably practical, moderate impact – management responsibility should be specified			
	1-5	L	Low risk – no further action required, Low impact – managed by routine procedure			
	0	0	No impact – Neutral			
	+	+	Positive Impact			

Table 5.7 Further Definitions of Consequences on the Risk Assessment Matrix

Severity	Potential Impact	Definition
0	Zero Effect	No environmental damage. No change in the environment. No financial consequences.
1	Slight Effect	Local environmental damage within the fence and within systems. Negligible financial consequences
2	Minor Effect	Contamination, damage sufficiently large to affect the environment, single outdo of statutory or prescribed criteria, single complaint.
3	Localized Effect	Limited discharges of known toxicity. Repeated outdo of statutory or prescribed limit. Affecting neighbourhood.
4	Major Effect	Severe environmental damage. The company is required to take extensive measures to restore the contaminated environment to its original state. Extended outdo of statutory or prescribed limits.
5	Massive Effect	Persistent severe environmental damage or severe nuisance extending over a large area. In terms of commercial or recreational use or nature conservancy, a major economic loss for the company. Constant high outdo of statutory or prescribed limits.

The identified associated and potential impacts from the various activities of the proposed project as outlined in Table 5.4 are determined, quantified, and ranked as outlined in Table 5.8 below.

Table 5.8 Impacts quantification and Ratings of the proposed project

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
Pre-construction	Land Acquisition	• Community agitation over compensations, land disputes, wrong stakeholder identification and leadership tussles.	-	ST	-	R	5	3	3	3	5	19	HIGH
		• Lobbying, agitations for jobs, employment and contractual agreement by local workers.	+	ST	-	R	0	1	3	3	5	12	MEDIUM
		• Exclusion of vulnerable groups from consultations which may lead to strife.	-	ST	-	R	0	1	1	1	3	6	LOW
		• Increased income generation.	+	-	LT	R	0	1	3	3	5	12	MEDIUM
	Employment of both Skilled and Unskilled workers	• Creation of employment for skilled and unskilled workforce.	+	-	LT	R	0	3	3	5	5	16	MEDIUM
		• Skill acquisition and enhancements to local indigenes and workforce.	+	ST	-	I	0	1	3	3	5	12	MEDIUM
		• Business opportunities for local contractors through sub-contracting activities.	+	ST	-	R	0	1	3	5	5	14	MEDIUM
		• Conflicts/community agitations over employment issues (quota and methods).	-	-	LT	R	3	1	3	3	5	15	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		• Increase in social vices (crime rate, prostitution, device, polygamous marriage etc),	-	-	LT	I	3	1	1	1	1	7	LOW
	Mobilization of equipment and personnel to site	• Increase of dust particles and vehicular emissions Nuisance (noise and vibrations) due to movement from heavy duty equipment and vehicles affecting site workers	-	ST	-	R	3	1	1	3	3	11	MEDIUM
		• Increased Income and local economy.	+	-	LT	R	0	1	3	3	3	10	MEDIUM
		• Increased pressure on existing social infrastructure	_	ST	-	R	0	1	1	1	3	7	LOW
		• Increased social vices.	-	ST	-	R	3	1	1	1	1	7	LOW
		• Increase of communicable diseases due to influx of people	-	ST	-	R	3	1	1	3	3	11	MEDIUM
		• Increased traffic during mobilization on road with risk of accidents leading to injury/death and loss of asset	_	ST	-	R	3	3	3	3	3	15	MEDIUM
		• Risk of terrorist attack and hostage taking leading to injury/death of personnel	-	ST	-	I	3	3	1	3	3	13	MEDIUM
		• Reduction in aesthetics of environment due to indiscriminate waste disposal.	-	ST	-	R	3	3	3	3	3	15	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
	Clearing of vegetation and other debris	▪ Loss of vegetation in the project area.	-	-	LT	I	3	3	1	3	3	13	MEDIUM
		▪ Loss of wildlife, their habitat and migration of wildlife.	-	-	LT	I	3	3	1	1	3	11	MEDIUM
		• Exposure of soil surface to the elements and triggering of erosion.	-	ST	-	I	0	3	1	3	3	10	LOW
		• Soil degradation e.g. compaction of soil as a result of the movement of earth moving equipment	-	-	LT	I	1	5	3	1	3	12	MEDIUM
		▪ Injuries from wildlife attacks (snakes bites and insects stings).	-	ST	-	I	0	3	1	3	3	10	LOW
		▪ Injury from equipment usage during vegetation clearing.	-	-	LT	R	0	5	1	1	3	10	LOW
		▪ Domestic and Sanitary Waste Generation	-	ST	-	R	3	3	3	3	3	15	MEDIUM
Construction	Civil works activities such as construction	• Employment of local labor and skills acquisition for workers taking advantage on new opportunities.	+	-	LT	R	3	1	3	3	5	15	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
	of buildings, Installation of plant equipment and other auxiliary facility	• Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting	+	-	LT	R	0	1	1	3	5	10	LOW
		• Increase in revenue opportunities for local population due to presence of non-resident workers and travelers.	+	-	LT	I	0	1	3	3	3	10	LOW
		• Increased cost of living due to inflation arising from increased demands.	-	-	LT	I	0	1	3	3	5	12	MEDIUM
		• Increase in social vices	-	-	LT	R	1	1	3	3	1	9	LOW
		▪ Decrease in air quality as a result of emissions/dust from vehicles and equipment.	-	-	LT	I	3	3	3	1	3	13	MEDIUM
		▪ Loss of flora and fauna	-	-	LT	I	3	3	1	3	3	13	MEDIUM
		▪ Noise nuisance (including impulsive noise) from construction activities, resulting to temporal migration of sensitive mammals and rodents	-	-	LT	I	0	3	1	1	3	8	LOW

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		▪ Groundwater contamination resulting from accidental leakages and spill of hazardous substances (diesel, lubricants, hydraulic oil etc)	-	ST	-	I	3	3	1	3	3	13	MEDIUM
		▪ Workplace accidents from burns, cuts, bruises, trips and falls, object at height leading to injury of fatalities.	-	ST	-	I	3	3	1	3	3	13	MEDIUM
		▪ Risks injury/death and loss of assets resulting from accidents associated with road transportation to and from construction sites	-	ST	-	I	3	3	1	1	3	11	LOW
		▪ Reduction in environmental aesthetics value due to indiscriminate disposal of wastes.	-	ST	-	I	3	3	1	3	3	13	MEDIUM
		▪ Inhalation by onsite workers of cement dust and toxic fumes during foundation works and welding of material components	-	ST		R	1	3	1	3	3	11	MEDIUM
		▪ Soil degradation and possibly accelerated erosion	-	ST	-	I	0	3	1	3	3	10	LOW
		▪ Reduction in structural stability and percolation ability of the soil.	-	ST	-	I	0	3	1	3	3	10	LOW

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		▪ Traffic congestion during transportation of demobilized equipment and personnel	-	ST	-	R	0	1	1	3	3	8	LOW
		▪ Potential collapse of buildings/structures on land as a result of unstable geotechnical conditions	-	ST	-	I	3	3	1	3	1	11	MEDIUM
		▪ Restriction of access roads to prevent unauthorized uses	-	ST	-	R	0	1	1	1	1	4	LOW
		▪ Loss of employment and business opportunities due to completion of construction phase	-	-	LT	R	0	3	1	3	3	10	LOW
		▪ Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting	+	-	LT	R	0	1	3	3	5	12	MEDIUM
		▪ Increase in revenue opportunities for local population due to presence of non-resident workers and travelers	+	-	LT	I	5	1	3	3	5	16	MEDIUM
		▪ Employment of local labor and skills acquisition for workers taking	+		LT	I	3	1	3	3	5	15	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		▪ Injury and death due to work place incidents.	-	ST	-	I	0	3	1	3	3	10	LOW
		▪ Community conflicts arising from disagreement over contracts and recruitment.	-	ST	-	R	3	3	1	3	3	13	MEDIUM
		▪ Increase in social vices and kidnapping	-	-	LT	R	3	3	1	3	3	13	MEDIUM
		• Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks.	-	ST	-	R	3	3	1	3	1	11	MEDIUM
		• Offcuts and packaging materials (Solid), domestic/ sanitary waste etc.	-	ST	-	R	3	3	1	3	3	13	MEDIUM
Operation	Operation of the Petrol Filling Station and maintenance of the infrastructure facilities	• Injuries/fatalities of personnel due to road accidents during facility inspection and maintenance/ checks	-	ST	-	I	0	3	1	3	3	10	LOW
		• Explosion, electrocution or fire hazards at the facilities.	-	ST	-	I	0	1	1	1	3	6	LOW
		▪ Revenue generation for both state and federal governments.	+	-	LT	I	5	1	3	5	3	17	MEDIUM
		▪ Employment for both skilled and unskilled labour.	+	-	LT	R	5	1	3	3	5	17	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		▪ Increased business opportunities and quality of life (small, medium and large scale)	+	ST	-	R	3	1	3	3	5	15	MEDIUM
		▪ Unchecked encroachment on the project site, leading to land-use conflicts and accident	-	ST	-	R	0	1	1	1	1	4	LOW
		▪ Pressure on existing infrastructure.	-	-	LT	R	0	1	1	2	1	5	LOW
		▪ Increased social vices.	-	-	LT	I	0	3	3	3	3	12	MEDIUM
Decommissioning and closure	Demobilization of equipment and personnel from site after project lifespan.	▪ Loss of employment	-	ST	-	R	3	3	1	3	1	11	MEDIUM
		▪ Risk of accident and injury to workers during demolition of structures	-	ST	-	R	3	5	3	1	3	15	MEDIUM
		▪ Traffic obstruction from transportation of decommissioned structures and equipment.	-	ST	-	R	3	1	1	3	3	11	MEDIUM
		▪ Waste generation and management.	-	ST	-	I	3	3	1	3	3	13	MEDIUM
		▪ Emission of dust, exhaust fumes/noxious gases from vehicles, and increased ambient noise level.	-	-	LT	I	3	5	1	3	3	15	MEDIUM
		▪ Increased turbidity of surface water and shoreline erosion.	-	ST	-	R	3	3	3	3	1	13	MEDIUM

Project Phase	Project Activities	Potential/Associated Impacts	Beneficial /Adverse	Short Term	Long Term	Reversible/ Irreversible	L	R	F	I	P	L+R+F+I+P	Ranking (High/Medium/Low)
		• Loss of revenue earner for state and federal government.	-	-	LT	I	0	3	3	5	5	16	MEDIUM
		• Reduced pressure on infrastructure.	+	-	LT	I	0	1	1	1	3	6	LOW

KEY: * - (Adverse), + (Beneficial); Short Term (< 3 months), Long Term (>3 Months); R = Reversible, I = Irreversible.

5. 7 Description of Impacts

5.7.1 Positive Impacts

- **Employment creation**

The proposed project will generate both direct and indirect employment. It will directly offer jobs on temporary basis during the construction. About thirty (30) persons are expected to be involved in construction phase. In addition, on completion of the project more than fifteen (15) persons will be employed on permanent basis.

- **Local economy**

As noted earlier in this report, energy plays a pivotal role in economic growth and development. The establishment of a petrol station in this area will serve to improve accessibility of petroleum products to the neighborhood and motorists thus boosting the economy. Government will also drive additional revenue from the venture.

- **Aesthetics**

The petroleum retail outlet station on completion shall be landscaped to make it a likable and enjoyable place to work in to visit. Its design is intended to improve the natural beauty of the area. The aim is to upgrade the area and improve the value of land. It will be a modern structure built in an area that has largely been left to be developing with proper plan.

- **Attractive Investment Destination**

This development will improve in the attraction of the area and may well be the impetus needed to attract other high capital investors to the area and Abuja as a whole.

5.7.2 Adverse (Negative) Impacts

The project has the potential to have significant negative environmental impacts if safety measures are not taken to curb any untoward damage on time. The filling station operations shall generate a range of atmospheric emissions, waste water discharges, and solid and semi liquid waters. Most of the solids and semi liquid waste will require disposal offsite.

5.7.2.1 Pre-construction

- **Impacts of Site Clearing/Preparation Activities**

Construction of a filling station facility will require that all the vegetation be removed from the site to pave way for the construction of buildings, roads, walkways and other facilities. Cleared top soil will be stockpiled and reused for landscaping. Excess topsoil, if any, will be moved to a stockpile to be used at other locations or used to reclaim existing swamps in the study area. Useful materials cleared from the sites will first be offered to local inhabitants. Vegetation and other material which have no re-use value will be burnt on site. Associated and potential impacts related to site clearing activities are related to the physical clearing process, the alteration of the landscape and conversion of lands (land takes). The overall impact significance is therefore moderate.

- **Impact on Human Movement**

During the mobilization activities, portions of the sites will be block to restrict public access for safety and security purposes. Although most of the project sites will be acquired by the contractors, any regular transport and traffic routes (foot paths and road tracks) that cross the sites could be cut off, requiring diversions or the use of alternative routes. These disruptions will negatively impact human movement and could affect social, economic and livelihood networks in the study area. Overall impact significance is low.

- **Impact on Transportation**

Transportation of workers and materials during the site clearing, preparation and onsite construction activities of the project will lead to increased traffic activity along the main road into Project areas. Increased vehicular traffic in the study area could lead to longer commuting time for existing road users. The increased traffic could also lead to additional road accidents. The overall impact significance is therefore low.

- **Impact on Soil and Ecology**

Site clearing activities will involve the removal of vegetation and top soil as well as the clearing of flora across various habitat types in the project Some flora and fauna within these habitats are economically, medicinally and ecologically important. Clearing will result in a loss of habitat for the fauna including wildlife. The clearing activity will also result in further degradation of soil fertility. Overall impact significance is therefore moderate.

- **Impact on Micro and Macro Economy**

The physical presence of workers in the project areas during the site preparation of the access roads, excavation and construction together with employment-seeking migrants will result in increased commercial activities around the project office and nearby communities and those near active work areas. Some labour will be hired locally. There is a high likelihood of an increase in the price of food, medicine, transportation and general goods and services in the project areas as a result of the influx. Overall impact significance is moderate.

- **Vibration and Noise**

Site clearing activities will involve the use of chain saws, bull dozers, and other motorized equipment. Noise and vibration levels around work areas during site clearing will therefore increase, but only during the day as no work will be performed at night. Noise and vibrations would also cause birds, and other mobile fauna to move away from the source, while nearby communities could experience unusual noise and vibration impacts; noise effects on humans are covered under health impacts. Overall impact significance is therefore low.

- **Wastes generation**

Different wastes will be generated during the project pre-construction activities. The wastes will comprise industrial and domestic waste from the project yard. Some wastes generated from site clearing that are not taken away for use by the local people will be burned on site. Contractor's project yard will be equipped with sanitary waste systems and garbage collection systems. The project contractor will also implement a waste management plan for all activities leading up to the commencement of the project operations. Overall impact significance is therefore low.

- **Air Emissions**

Ambient air quality monitoring indicates that only low levels of pollutants of concern currently exist in the project area. The pre-construction activities associated with the project will result in emissions of air pollutants during the operation of combustion engines, burning of organic material from site clearing, and dust during site clearing and grading. The emissions could cause an increase in concentrations of sulphur oxides, nitrogen oxides, carbon monoxide, Volatile Organic Compounds (VOC) and particulates within the immediate vicinity of emission sources. Dust created from general

construction activities would also lead to an increase in air pollutants around the project area. Overall impact significance is therefore moderate.

5.7.2.2 Construction phase

- **Air Pollution**

Air emission result from site preparation and construction activities such as excavation, earthmoving and filling, stone cutting and concrete processing as well as the loading and unloading of construction material and waste. Impacts include increased dust and airborne particulates caused by grading, filling, removals and other construction activities. After construction activity is completed, dust levels are expected to return near non-existing conditions. Air quality impacts may also result from emission from construction equipment and possibly from traffic at the entrance of the project site to deliver materials.

This might lead to an increase in respiratory problems and incidences of flu among children in the neighborhood.
Other air pollutants include the following:

Carbon Monoxide
Carbon Monoxide (CO) is almost exclusively emitted by motor vehicles. This pollutant binds the oxygen-carrying protein in blood to hemoglobin, reducing the amount of the oxygen reaching the heart and brain. Exposures to CO, even at low levels, endanger people with coronary artery disease. It can also cause headaches, figure, and slow reflexes, even among healthy people.

Small Particulates **(PM-10)**
Such particles are so small that, individually, they would not be visible. The fine particles are a threat to health, however, because they penetrate deep into the lungs during breathing and lodge there. (Large particles, by contrast, are filtered out in the upper respiratory passages, or are cleared by coughing, sneezing, etc.)

Oxides of Nitrogen
Nitrogen oxides (NO_x) are produced by motor vehicles (particularly heavy-duty vehicles) and high-temperature industrial operations but have not posed a known health problem in the project area.

This impact is short term and will last with the construction process of the project. During the construction phase of this facility precautions shall be taken to minimize these impacts.

- **Noise Pollution**

constructions generally require the use of heavy machinery, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. These can degrade the human welfare, health and disrupt activities within noise sensitive areas like schools and hospitals. The elevated noise and vibration levels within the site can variously affect the project workers and the residents, passers-by, wildlife and domestic animals, within the vicinity. All these disturb the natural surroundings; on the other hand, significant vibrations may also affect the nearby structures such as roads. Overall impact significance is therefore moderate.

- **Soil Erosion**

Construction works usually expose soils to agents of erosion. Use of heavy machinery and equipment also compact soil hence inability to support plant growth leaving the soils bare and exposing them to erosion agents. Side drains, especially outfalls/mitre drains may increase soil erosion on cultivated fields. Land clearance needed will uproot trees and crops as well as displace topsoil. The clearing of natural vegetation cover could lead to increased soil erosion. This impact is rated significant.

- **Risks of Accidents and Injuries to Workers**

During construction activities including metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result to trip and falls, injuries from hand tools and equipment cuts from sharp edges of metal sheets among others. This impact is rated moderate.

- **Drainage**

Drainage structures to be designed shall include pipe culverts, box culverts and drains/ditches. Lack of drainages may increase the chances of soil erosion as with the current status of the project area. However, the proposed project shall provide drainages that will address drainage issues in the study area. This impact is beneficial to the project affected communities.

- **Reduced water supply to local community**

Water sources will be sufficient for the construction works and domestic use. The concern is the water quality due to abstraction by the project works and its associated waste water management. This impact is rated as significant.

- **Groundwater contamination**

Construction equipment generates large amounts of waste oil and its proper handling is critical. Haphazard storage and leakage can result in the contamination of soils and ground waters. Oil products can also lead to contamination of surface and groundwater if there is a lack of fuelling, maintenance and servicing protocol for construction machinery at the project site. Pollution of water resources by oil-based pollutants from trucks and construction machinery during construction works could cause health problems for the population downstream. This impact is major.

- **Solid Waste**

Construction will result in the creation of various solid wastes, principally surplus earth (spoil) and rock (soil debris), metal scraps, plastics (wrappings and containers), cardboard, paper, wood, office wastes including e.g. used toner cartridges, kitchen (canteen) wastes, workshop wastes including e.g. used oil filters, and waste concrete. This can be a nuisance and the site should therefore be kept clean, neat and tidy at all times. No burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted. The Contractor shall implement measures to minimize waste. Overall impact significance is therefore moderate.

- **Wastewater and contaminated water management**

During the construction phase, various liquid wastes including grey and black water (respectively washing water and sewage), concrete washings, runoff from project yard and workshop areas, and various liquid waste streams from washing construction equipment washing will be generated. These wastes pose real toxicity and quality threats to the soil and ground water, as well as existing wetlands within the area. Overall impact significance is therefore moderate.

- **Discrimination on Employment Opportunities**

Most of the skilled labourers will have to be brought in from outside the project area, and this may cause some resentment among the local people.

Generation of employment opportunities by the project could result into conflict between local residents and new comers or outsiders, if not appropriately managed. A concern expressed during consultations was that unskilled labour may be available to men more than women leading to gender discrimination. Overall impact significance is therefore moderate.

- **Occupational Health and Safety**

Construction phase may involve employment of hundreds of workers in site, increasing chances of workplace accidents, injuries and illnesses. It will thus be paramount that the contractor adheres to best practices in occupational health and safety. Overall impact significance is therefore moderate.

- **Social Disruption**

Construction activities will cause some degree of disruption to social order within the project area, and specifically around the Contractors project yard. Managing the welfare of a significant number of workers is inevitably a major challenge, and the co-existence of multiple contractor crews of workers from diverse cultural and geographic backgrounds can be a challenge. During construction, the contractor will be required to implement measures to protect the welfare of the community. This should be achieved via application of a grievance mechanism, which must be developed prior to the construction programme. Overall impact significance is therefore moderate.

- **Impact on Infrastructure**

The influx of engaged workers and job seekers will lead to increased demand for goods and services and will cause some pressure on existing infrastructure such as housing, educational facilities, roads, hospitals and others in the study area. As has been observed on other similar projects in Nigeria, local residents may lease their houses to migrants and there will be an increase in road traffic, which will further put some pressure on the existing roads. Overall impact significance is therefore moderate.

- **Employment Opportunities**

Creation of employment opportunities has both economic and social benefits. During the construction period, new jobs will be created in the form of skilled and unskilled labour. A majority of unskilled labour will be sourced from the local residents. Indirect employment will be in the form of

suppliers and other forms of sub-contracted works that will be required for construction. Support businesses such as food kiosks may also grow near the project office and along the road corridor. This is a major positive impact.

- **Skills Transfer and Training**

Through labour recruitment locally the workers will have an opportunity to learn an array of skills that relate to road construction and ancillary works. Improved transport will improve interaction with other communities that will also provide an opportunity for further learning and cultural exchange. This is a major positive impact.

- **Gains in the Local and National Economy**

There will be gains in the local and national economy as a result of the construction of this proposed Project, through consumption of locally available materials including: timber, metals and cement. The consumption of these materials in addition to fuel oil for the machines to be used at the site and others will attract taxes including Value Added Tax (VAT) and Income Tax which will be payable to the government. The cost of the materials will be payable directly to the suppliers. This is a major positive impact.

- **Provision of Market for Supply of Construction Materials**

The proposed project shall require supply of large quantity of materials most, of which will be sourced locally in and surrounding areas. This provides market for material suppliers such as quarry companies, sand, wood, cement, paints and roofing material dealer as well as other dealers of building materials and local food sellers. The impact is rated significant and positive. This is positive significant impact.

5.7.2.3 Operation

- **Employment Opportunities**

Some people will be employed by the project as management and enforcement agents, caretakers, cleaners, security personnel and technicians for street lights, drainages and plumbers. This is a positive significant impact.

- **Water and Sanitation**

The project will improve delivery of portable water, effective and accessible

sanitation services through the provision of drainages, sewerage and portable water distribution network. This is a significant positive impact.

- **Potential to Improve Drainage**

Overall, the hydrology and drainage of the study area will be improved due to the provision of drainage structures such as culverts and other cross - drainage facilities like side drains**.** The current drainage structures are mainly inadequate. This is a major positive impact.

- **Infrastructure**

This project has the tendency of improving the infrastructure existing in the study area. The proposed development will augment existing social amenities and stimulate growth in other sectors such as housing and ultimately add to development in the area. This is a major positive impact.

- **Air Emissions**

Air emissions during operations will include Dust, nitrogen oxides, sulphur oxides, carbon monoxide, volatile organic carbons (VOC) and some particulates. The modelling considered emissions from the project which are identified as the main sources of criteria air pollutants in the proposed project. Criteria pollutants modelled for the ground level concentrations include: carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC) and total suspended particulate (PM) due to the characteristics of the fuel to be used during operation. The overall impact significance is therefore low.

- **Sanitary and Solid Waste Health Effects**

While the project will implement a program to manage solid and liquid wastes, increased population in some settlements as a result of in-migration will cause an increase in sanitary waste discharges and effluents. Untreated sanitary waste and other effluents as well as solid waste can increase the existing prevalence of water and vector borne diseases (e.g., typhoid and diarrhoea) and other disease vectors in the project area.

The magnitude of the potential impact is low the since anticipated population increase in affected communities during the site clearing and construction phases of the project would be generally low for most communities. Overall impact significance is therefore moderate.

- **Noise and Vibration Impacts**

There will be an increase in noise and vibration during the implementation of various activities associated with the project. Increased noise and

vibration will be associated with vehicular movement and horning, workshops, and other installed components.

Overall impact significance is therefore moderate.

- **Accidents**

Accidents including spills (fuel and other hazardous chemicals), fires, vehicular accidents, and work area mishaps affecting the general public are possible hazards during the operational phases of the Project. Population influx during operations will increase the risk of such accidents, including domestic fires. Overall impact significance is therefore high.

- **Increased Traffic**

During operations, there shall be additional vehicles bringing in the petroleum products and customers coming for patronage. There will also be heavy and light vehicles moving in and out of the facility supplying various materials or bringing in staff. The additional traffic, estimated between 30-50 vehicles per day may cause an impact on the access roads in the area.

The above estimated increase in traffic density is within acceptable limits and should not cause any undue hindrance to the free-flowing traffic in the area. Moreover, most of this traffic will occur during the daytime.

- **Fire Hazards**

Fire may present a potential danger for filling station and its amenities. The principal potential hazard with filling station is fire an explosion. A fire is a combustion which develops in a totally uncontrolled manner with respect to time and space. It produces tremendous quantities of heat, smoke and polluting and even toxic gasses. The energy generated further favors the spreading of the fire.

Premium motor spirit (PMS) is one of the products to be sold by the petrol filling station (PFS), which are highly flammable. Fire outbreak frequently occurs during discharge of the product (s) into underground and surface storage tanks or during service to vehicles and customers. These have often led to loss of lives and properties.

Impacts on Humans

Smoke and release of gasses such as CO_2, CO, H_2S which can cause the following hazards:

- High Temperature (internal burns by inhalation of hot gasses)
- Opacity (which obstructs the view for evacuation)
- Asphyxiation through lack of oxygen (the oxygen concentration in ambient air is 21%, during a fire, this concentration is drastically reduced).
- Ozone depletion.
- Flames and Heat
- The flames temperature ranges from 600^0C to 1200^0C object.

Impacts on the filling station, neighboring homes and facilities
The destruction of the buildings and personal effects.
Cost associate with the damages caused
Destruction of the entire filling station.

- **Petroleum Products and Associated Health Safety Hazards**

Incomplete combustion leads to production of Carbon monoxide (CO), Volatile Organic Compounds (VOCs) fuel, nitrogen oxides and thousands of compounds in both gas and particulate phases. VOCs are hazardous to human health, for instance, long exposure to benzene may lead to cancer (EHC, 2003). NOx cause irritation of respiratory track and may exacerbate asthma and may damage blood vessels. Exposure to lead, leads to several physiological disorders in man with the most sensitive parts being kidneys, blood and nervous system. The emissions may also contaminate the environment including soil and water.

- **Spillages and Leakages**

Spillages and leakages from the bulk storage tanks, pipes or bulk transport vehicles can occur with devastating results, viz fire and/or explosion.

- **Security**

Security within the premises is a major issue that must be addressed as lack of security can impair the operation of the facility. The aim of a security system is to ensure the safety and security of the staff, clients and visitors to protect the facility against any hostile activity e.g theft, vandalism etc, to maintain public order and proper behavior in the petrol station and to allow the users of the facility a quiet environment and privacy.
It will also enable a fast and efficient response in case of any accident which requires interaction with external authorities such as police, emergency,

first-aid, etc. Security also guaranteed the proper and honest behavior of all employees.

- **Micro Climate Modification**

The filling station will consist of structures made of concrete metal. This may result in a rather hot surrounding within the generally very warm temperatures in the area.

- **Storm-water Management**

The climates indicate that rains are moderate in the area however, due to the topography of the project site location, there will be a sizeable collection of storm waters from the roof of the canopies and refilling platform, administration block and the entire site which might cause flood, if preventive measures are not taken.

- **Sewage Management**

Inappropriate planning and design of a septic system may cause pollution of water bodies. Most facilities in the area use septic tanks as there is no provision for public sewerage system in the area. If not well designed and maintained, there is a great possibility of a system overflow leading to massive environmental hazard. A properly designed and operating septic system is odor free and besides periodic inspection and pumping of the septic tanks, should last for decades with no maintenance. The following impacts may affect the septic tank:

Impact.

- Excessive dumping of oil and grease can fill up the upper portion of the septic tank and cause the inlet drains to block. Oils and grease are often difficult to degrade and can cause odour problems and difficult with the periodic emptying.
- Flushing non-biodegradable hygiene products such as sanitary towels and cotton bubs will rapidly fill or clog a septic tank; these materials should not be disposed of in this way.
- The use of garbage disposers for disposing of waste food can cause a rapid overload of the system and early failure.
- Certain chemicals may damage the working of septic tank, especially pesticides, herbicides, materials with high concentrations of bleach or

caustic soda (lye) or any other inorganic materials such as paints or solvents.

- Roots from trees and shrubbery growing above the tank of the drain field may clog and or rapture them.
- Excessive water entering the system will overload it and caused it to fail.
- Even well-maintained septic tanks release muscus-producing anaerobic gut bacteria to the drainage field. The muscus "smile" will slowly clog the soil pores surrounding the drain pipe and percolation can slow to the point where backups or surfacing influent can occur. This slime is called bio mat and such a failure is referred to as "Bio mat failure"
- Septic tanks by themselves are ineffective at removing nitrogen compounds that can cause algae blooms in receiving waters.

- **Impact on Water Resources**

Petroleum products retail outlets stations do not require water for any of the marketing processes both surface (lakes, stream and river). Waste water containing oil may be discharged during the cleaning and maintenance of generators and vehicles.

The ground/soil and surface water become useless when it gets polluted with oil since it will not support both plant and animal life. Hydrocarbons can mix up with water and affect the natural biochemical components of water thereby affecting the ecosystem. The Water Solution Fraction (WSF) and other volatile compounds exert acute lethal effects on aquatic fauna.

5.7.2.4 Decommission

- **Air Quality**

Possible air pollution emanates from leakages of storage facilities.

- **Waste Generation**

During decommissioning phase, the expected waters are debris such as concrete and sand, nails, metal scraps and of-cuts, building blocks and waste wood, roofing tiles, floor and wall tiles, wires, piping, etc. If not properly disposed, can result in the pollution of the soil, ground water and air (paint). Materials consisting of chemicals e.g paints, cement can alter the chemical composition of environmental components.

- **Socio Economy**

There would loss of job after decommissioning the facility. The esthetics value of the area will no longer be there.

- **Waste Generation and Management**

Waste generated during site preparation, construction, operation and decommissioning stages are mainly solids waste such as used plastic, pieces of metallic objects, oily rags, used oil filters, waste oils and solvent, nylon and sludge from underground tanks. Most of which will be collected for reuse or recycling. Wastes generated during project operation include oily rags, used oil filters, plastics, waste oils and solvent, nylon and sludge from underground water. The management should make sure that wastes that are recyclable are taken for recycle and those that cannot be recycling should be disposed by a registered waste collection consultant and the management should monitor waste from collection to disposal to make sure the waste are disposed in an environmentally safe manner.

5.8 Cumulative Impacts

Cumulative impacts are changes to the environment that are caused by certain activity in combination with other past, present, and future human activities.
The concept of cumulative effects is an important one. It holds that while impacts may be small individually, the overall impact of all environmental changes affecting the receptors taken together can be significant. When a resource is nearing its tolerance threshold, a small change can push it over. The objective of the cumulative impact assessment is to identify the environmental and/or socio-economic aspects that may not on their own constitute a significant impact but when combined with impacts from past, present, or reasonably foreseeable future activities associated with this and/or other projects result in larger and more significant impacts.
Cumulative impacts arising from this proposed JRB petrol filling station Project shall be minimal because the project shall be executed with the latest more environmentally safe available technology which shall reduce greenhouse house effect and climate change. However, there could be cumulative impact such as loss of biodiversity, decrease in air quality etc. especially when there are other operators in JRB petrol filling station.

CHAPTER SIX

RECOMMENDATION AND MITIGATION MEASURES

6.0 Recommended Mitigation Measures

The proposed project is generally a positive development in terms of economic progress in the petroleum sector. However, while the beneficial aspects are quickly realized, negative impacts from the development should also be appreciated and necessary measures incorporated in the project design, construction and eventually throughout its operation. The duty of achieving this, therefore, lies with proponent, the Project Design Architects and Engineers, the Contractor as well as the Operators and their Supervisors upon commissioning.

In view of the above, it is suggested that;

Appropriate environmental, health and safety guidelines are developed at the initial planning stages of the project to guide the entire project implementation process,
Other ongoing activities at and around the site be evaluated with respect to the environment, health and safety with a view to incorporating the proposed project and improvement of the related infrastructure,
The project implementation does not cause unnecessary disruption to public utilities (e.g. water supply, power supply, waste water treatment systems, water resources, road network, etc.) and other land users in the area,
That safety and security of the surrounding communities will not be compromised,
Necessary technological considerations are considered to provide an acceptable waste quality and disposal procedures to safe guard natural resources such as people's health and ground water sources,

Below are specific mitigation measures recommended for the significant environmental aspects?

6.1 Planning and Design

6.1.1 Planning

While planning for this development it will be necessary to consider the following basic aspects (some already addressed in the project document) of environment;

- The health of the workers and the neighboring communities is of key importance and necessary mechanisms should be provided for this purpose at the project planning phase (see health and safety below),
- Safety for on-site installations and people as well as those in the neighboring communities should also be considered in the project plans. This includes fire safety measures.

6.1.2 Design

The layout and operation of the proposed petrol station is expected to;

- Integrate within the existing environmental infrastructure at site to facilitate sharing of services and amenities (e.g. power, water, solid refuse collection and roads), safety arrangements and waste management systems among others. This has already been catered as per the proposed project designs.
- Minimize risks to health and impacts to external environment. Suitable anti-pollution facilities (solid waste containment and organized removals, waste water purification) should be part of the design. This has been incorporated in the preliminary designs.
- Consider changing environmental practices, market demands and availability of technology for flexibility on alternatives that do not have significant effects to the environment.

6.2 Construction Impacts

Though the construction phase will normally involve mobilization of construction materials, excavations and earth moving, effects from the proposed site are not expected to be significant in the neighboring areas. However, to mitigate any impacts to the surrounding communities, the construction equipment requires to be maintained at the best possible mechanical conditions to minimize aerial emissions (carbon dioxide, hydrocarbons, particulate matter etc.). The contractor will also therefore be expected to advise materials delivery trucks to observe utmost care on road safety, define specific safe roads to be used and maintain trucks in good condition to reduce exhaust emissions.

Common construction materials are generally harmless to the natural environment, but related debris could become an aesthetic nuisance. All wastes emanating from the construction activities are expected to be disposed into designated grounds by the Council Authorities. Such debris includes

excavated soils, concrete wastes, building blocks, packaging materials and timber wastes.

Dust is one major environmental problem expected from construction sites. In order to reduce dust from the site, delivery trucks will always be covered, while the open stocks of sand and ballast will be constantly sprinkled with water to keep it moist. Care will be taken at all times when handling cement to minimize cement dust. In this connection, construction workers will be expected to be provided with personal protective equipment (dust masks, gloves, overalls/dust coats, boots and helmets) while at the construction site. Application of the same will be enforced.

The excavation of underground tanks pits should be such that the tanks should not be less than seventy centimeters below ground level when it is set to its final position. The tanks should rest upon and be trapped to a concrete raft and must be of sufficient weight to overcome tank buoyancy.

Document (photography or imagery) stages of construction as evidence of compliance with mitigation measures and approved plan particularly as regards to specified standards of structures such as the concreting of the floor and sides underground tank pits and that of the station.

As part of project post-commissioning monitoring the management of the petrol filling station shall submit to the Director of Petroleum Resources, twice a year during the site preparation and construction phases and on annual basis for a minimum of five (5) years after the project/activity/action completion phase.

All construction work on the project site should be done in the presence of an assigned NMDPRA inspector.

6.2.1 Impacts on Vegetation

Mitigation measures on vegetation loss:

- Vegetation loss is set to be confined to the project location and will mainly consist of trees, grasses, weeds and shrubs.
- The proponent shall plant grass, trees and flowers around the compound in areas that will not have buildings or pavement.
- JRB Oil & Gas Limited shall plant trees along the perimeter.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.2.2 Impact on Topography

The site preparation for the development of the proposed petrol station will involve site clearance and leveling of the site by excavation and filling to get the desired construction level and the construction of drainage lines will likely affect the topography of the site. Hence, impact of topography will be during the site preparation period.

➢ **Mitigation Measures**

- Land clearing at the site will be kept at the absolute minimum practicable;
- A construction site will be designed to minimize the removal of soil and vegetation;
- Excavated earth from the foundation will be used at the site will be used for leveling and filling.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.2.3 Drainage Alteration

Mitigation measures

- The design of the project shall be undertaken in a manner to ensure that the surface is paved and slope towards storm drains;
- Ultimately the storm run-offs shall be channeled through rains flowing to the roadside drainages.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.2.4 Impact on Water Resources

During the construction phase of the petrol filling station, small quantity of metal cuttings, soil debris, etc. will be generated as wastes which are cleared after construction activity will be over and same will be disposed in an environmental sound manner. The water run-off from the construction site during heavy rainfall in monsoon months may cause some increase in the quantity of suspended solids and turbidity in the runoff on the nearby stream. The requirement of water during the construction phase will be at 1500-3000 liters/day.

Mitigation Measures

- Use of water will be minimized during the construction phase.
- Drainage channels and storm water drain will be constructed at the site.
- All the debris generated from construction site will be collected and disposed suitably.
- A sediment trap will be provided to prevent the discharge of excessive suspended solids.
- An oil trap will be provided in the drainage line to prevent contamination by accidental spillage.
- To prevent contamination from accidental spillage of fuel oil, the storage areas will be bounded and cleaned at regular intervals.
- Sewage generated from the site will be treated in septic tank followed by a soak pit.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.2.5 Solid Waste

Mitigation Measures during Construction and Decommissioning Phase

- During the construction period, an area shall be specifically designed for solid waste stacking. These will be segregated and categorized into re-usable, re-sale and those that cannot be used again.
- The waste designated area shall be well protected to reduce chances of littering the environment.
- Left over material that cannot be reused in any way shall be removed from site by licensed waste handlers.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.2.6 Dust Emission

Mitigation Measures:

- The soil surface shall be kept humid through water spraying to control the level of dust during site clearance and excavation works.
- Trucks carrying constructions waste shall be covered during their trip from the construction site to the final disposal location.
- In the event of strong wind on site, clearing work shall stop;
- Project site shall be kept wet prior to clearing;

- Routine watering of the construction site and access roads to the site.
- Utmost care shall be taken while handling cement and rock sand product.
- Construction materials shall be properly staked.
- Labor intensive methods of construction shall be used to reduce construction time;
- A sense of environmental responsibility shall be inculcated in the work force.
- Dispose of debris from the construction site by licensed waste trucks to authorized dumping site.
- Vehicles operating in the project shall be compliant with international standards on exhaust emissions.
- Construction workers who will be exposed to dust will be provided with nose masks.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.2.7 Noise

Mitigation Measures

During the site preparation and construction phases, a number of actions shall be taken to reduce noise level from operations within the site.

- Activities shall only be undertaken during daylight hours as during the night it would disrupt sleep of neighbors and create a nuisance.
- Workers at site shall be issued with ear muffs to protect their hearing from any high noise level.
- Heavy machinery shall not be a regular feature of the construction as materials will be brought into site periodically.
- A noise barrier around the site viz plywood shall be erected.
- All applicable occupational safety and health administration regulation requirements shall be followed.
- Construction equipment shall possess properly working mufflers and will be kept properly tuned to reduce backfires.
- During the site preparation and construction phases of the proposed project, when utilized, backup generators will create noise levels up to 75 dB(A)a. To minimize noise, generators shall be equipped with appropriate sound muffling devises.
- Power generating sets shall be soundproof, place at a safe distance to minimize the impacts on any nearby residential building not exceeding 50dBA.

- It is likely that there will be no measurable increase in noise levels from increased traffic at sensitive receptors along the roadways leading to the site.

Implementation of these measures will reduce the expected short-term noise impacts to an insignificant level in and around the site.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.2.8 Population Increase

Mitigation Measures

- The petrol station shall source almost all of its unskilled labor from the local communities in order to reduce an influx of population from outside the area.
- Requirements for the facility construction shall be made in an organized manner from the surrounding communities where possible; thereby reducing occurrence of opportunistic hawking that could result in a myriad of vices such as drug use and peddling, petty crime, alcohol abuse and harboring of criminals.
- During site preparation and construction phase close monitoring of workers shall be undertaken to ensure that unwanted characters are not absorbed.
- In addition, activities shall be undertaken in a closed environment and food and other requirements will be provided within to reduce traffic in and out of the building site.
- Security shall be enhanced in and around the project site to reduce cases of material theft and any other uncalled-for occurrences.
- Security agencies shall be requested to beef up the current small police post in the area.
- Petroleum Products and Associated Health Safety Hazards
- Observe strict safety precautions during construction. These include provision of personal protective equipment and clothing to all construction workers. The PPE should include coveralls, helmet, dust masks, wielding shield/goggles, earmuffs (where necessary), and appropriate foot wear.
- Supervision by competent engineers should be done throughout the project implementation. The engineers must ensure that materials used for the work are up to required standards, that proper mixing of element

is adhere to, proper workmanship and observation of building standards applicable to the project.

- Construction site be sealed off from non-construction workers ie general public. This will imply that all businesses be closed or relocated to safeguard life and property.
- Provision of first aid facilities and emergency response plan during construction.
- Provide toilet facilities and changing room for workers.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.3 Operations and Maintenance

6.3.1 Waste Generation

The Station in its day-to-day operations will generate various classes of waste, which include solid, liquid and gaseous wastes.

Mitigation Measures

- Restoration measures will be assessed and the appropriate local authorities consulted.
- The site will be cleared and restored.
- All uninstalled equipment shall be carefully dismantled, disposed in an environmentally safely manner. The useful once shall be given out for re-use or recycled.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.2 Solid Waste

Solid waste which might be generated at the site includes plastics, sand, cement, timber, steel, glasses, paper, debris, empty oil cans, rags, as well as empty water bottles. Others include biodegradable and non-biodegradable papers. Others include biodegradable and non-biodegradable. This waste should be collected and put in a disposal point.

Mitigation Measures

- Solids wastes shall be sorted for different components. There shall be different waste bins color coded and well labeled at the management contractors.
- Waste disposal shall be by accredited waste management company in collaboration with the waste management authority.

- Solid wastes (including garbage, papers, plastics and packaging materials, fat/oils) will be generated. The design should therefore, provide for the suitable solid waste collection receptacles at strategic locations at the premises. An accessible area with a concrete slab should also be provided for collection and storage of the various solid waste categories awaiting disposal.
- The management should make sure that waste that are recyclable are taken for recycle and those that cannot be recycling should be disposed by a registered waste collection consultant and the management should monitor waste from collection to disposal in an environmentally manner.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

Table 6.1 Waste management

Nature of wastes	Volume	Disposal method
Construction phase		
Soil	Moderate	Use for levelling and landscaping
Cement and other packaging materials paint containers, metals	Moderate	Re-use/Recycle to waste paper and scrap metal dealers
Timber	Small	Re-use or recycle for firewood
Operational phase		
Solid waste (papers, containers)	Small	Establish a waste collection point and litter bins for the premises
Wastewater (from toilet and surface)	Moderate	Storm drains along the highway and sewer system (to install oil-interceptor and monitor quality of effluent discharged into the environment frequently).
Emissions (from vehicles)	Moderate	Emitted directly into the air. Ensure vehicles are switched off.
Decommissioning phase		
Metal	Moderate	Recycle or re-use
Equipment	Moderate	Recycle or re-use
Concrete and blocks	Moderate	Use for rehabilitation or re-use
Soil	Moderate	Rehabilitation of site

6.3.3 Storm and Oily Waste Management

There are two groups of liquid wastes that will be generated from the station. The first groups of liquid are those which result from the use of toilet. The second category of liquids is that which might be generated from cleaning of the operation site as well as run-off resulting during rainy days. This waste carries silt, sediment oil and grease.

Mitigation Measures

- The proposed station management will put in place used oil waste collection point and a clear mode of waste management generated from cleaning of the operation site, as well as run-off resulting during rainy days. The oil interceptors will be put in place and periodic analysis will be carried out to ensure no contamination occur as a result of the station's activities.
- Also, all the drainage shall be covered with appropriate materials e.g. metal grills or concrete slabs.
- Storm drains and waste water collection systems including sewers and open drains should be clearly shown on the designs. Monitoring points should also be fitted on the drains/sewers, for this reason, specific design provisions should include;
- Surface run-off from open surfaces should NOT mix with the waste water.
- To mitigation against flood risk, the floor levels. Sustainable drainage strategy (SUDS) will be implemented by ensuring surface water drains are constructed for evacuating all the run-off waters.
- All the discharged points of oily waste water, solid wastes and spent lubricants should be registered with the DPR. This will help in constant monitoring of waste generated and the limit of disposal into surface water from the station.
- Maintenance of drainage channels and oil interceptor tanks.
- Spent lubricant should be differentially from other oily effluents and channeled into a source recovery system or into a receptacle approved by the NMDPRA.
- Discourage or avoid disposal of oil contaminated water on the ground.
- Regularly checking for plumbing leaks and practicing water conservation shall help the system's operation.
- There should be adequate provision for road side drainage line so as to ensure free and continues flow of the line to avert any potential flooding of immediate neighborhood.
- Covering the whole operational area with concrete hardstand.
- Use a nitrogen-reducing technology or ensure that the soak pit is properly sited to prevent direct entry of effluent into the environment.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.4 Oil Spills and Leaks

Surface spills and leaks are likely to happen during fueling and tank filling activities thus increasing risks of fire and ground contamination. The station drainage plan should ensure that all spillage arising from the forecourt operations are well managed.

Mitigation Measures

- Additional measures to contain spillages such as oil-retention booms be set up on the facility.
- Ensure leak-detection mechanisms are incorporated on the UST and piping.
- Develop a spill prevention and control plan to counter and manage emergencies that may arise in the event of accidental spillages.
- All spent oil must be stored in 200liter drums and disposed appropriately and any oil spill over 200 liters should be considered as an emergency. These and other similar measures stated above are aimed at forestalling underground water and soil pollution of the area.
- The proponent should draw up contingency plan prior to the commencement of facility operation and provide resources for prevention and timely response to spills. In case of oil spill, the proponent should clean up all hydrocarbons and chemical spills emanating from the company's operations in a timely and efficient manner. Details about the spillage/leakage must be reported within 14 days of the spill on the oil spillage/leakage report form. The oil spillage response/clean up report must be submitted within four (4) weeks.
- Impervious hard- standing areas.
- Automatic shut-off devices.
- A borehole or well should be provided within the project site and should be properly maintained, this will be used for monitoring of early warning/detection of underground tanks leakages.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.5 Gaseous Waste (Air Quality)

- The vehicles will be coming in and out and this may bring about dust.
- Emissions arise from automobiles and service/ delivery trucks
- Sweeping the surface on the site generates additional dust.
- Odours may be experienced in operational phase. Bad smells may arise from spillages and liquid wastes that are not cleaned up and

uncollected trash that may accumulate on the site, including used oils, and used rags from cleaning works.

- Fumes originating from petrol tank and during refueling as well as emissions from motor vehicle exhaust systems.
- Air Pollutants from Incomplete Petrol Combustion may bring about contamination of air which may affect the animals and plants.

Mitigation Measures

To minimize air emissions, the following measures are suggested:

- During operational phase, keep the forecourt clean; it should be regularly sprinkled with water to minimize dusts generated by traffic i.e., always suppress dust by water-spraying before sweeping.
- To avoid bad smells, spillages should be immediately cleaned up. An appropriately designed container for waste collection should be provided on the site for temporarily storage of uncollected trash. Prompt disposal of such material should be done.
- Avoid open-air incineration of trash near the station.
- To avoid fumes, smoke and volatile hydrocarbons, the generators should be properly maintained while the pumps nozzles should be well fitted into the vehicles tanks to prevent escape of hydrocarbons.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.6 Material Storage and Handling

Other than Class A and B fuel products, which are stored underground, there are other retailed products including engine oils and lubricants, which are stored in a section of the sales office.

Mitigation Measures

- The store should be reorganized such that materials of similar nature, use and properties are stored separately from other types and each section clearly labeled.
- The excavation should be such that the tanks should not be less than seventy centimeters below ground level when it is set to its final position.
- Due to the high level of ground water in the area during the rainy season, the only way to protect the underground tanks is to caste pits; burry tanks on raised support and they should rest upon and be trapped to a concrete raft and must be of sufficient weight to overcome tank buoyancy.

- ❖ The capacity of any individual underground storage tank shall not exceed forty-five thousand liters (45,000 liters) (EGASPIN Part VII B, sect. 4.2.1 (vi).

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.3.7 Fire and Explosion Hazards

The proposed station has indicated intentions to installed fire control measures for use in case of an emergency; this is together with fire assembly point which will be clearly marked. There is need to fully comply with existing regulations. However, there is still room for improvement as this is a very sensitive operation as far as fire is concerned.

Mitigation Measures

The following measures are recommended:

- Need to have sufficient powder fire extinguishers conveniently located at strategic locations within the filling station, such as fuel pumps island, generator house, station building and should be serviced after every six months.
- Designing and clearly displaying the fire emergency response plan on the walls of the station.
- Smoke and gas detectors shall be installed at strategic locations in the site.
- A fire alarm system comprising of break glass call points, fire detectors, sirens and a control indicator panel shall be installed within the premises.
- Provide appropriate training to the staff on fire emergency procedures and should be carried out by NMDPRA accredited consultant.
- Provide warning signs such as “No Smoking”, “Highly Inflammable”, “Switch Off Your Car Engine” and “No GSM Calls”.
- Install one water hydrant
- Dry sand buckets should be put in place at strategic locations within the filling station.
- Sources of naked flame from cooking should be avoided in the filling station.
- Training should focus on basic management of possible disaster situations such as fire disaster or explosion as well as on prevention.
- Construct a fence with masonry wall made from concrete or embankment with a height of not less than 1.5m, in order to prevent access to unauthorized persons and serve as fire outbreak.

- Electrical installations should be carried out by component and licensed electricians.
- Electrical earthling system should be provided for the following components:
  a. Metallic non-current carrying parts of all electrical apparatus such as transformers, switch gears, motors, lighting/power panels, terminal boxes, control stations, lighting fixtures, receptacles etc.
  b. Storage tanks, columns and all other process equipment
  c. Electrical equipment fencing (eg. Transformer)
  d. Cable shields and amour
  e. Pump handling hydrocarbons
- The thunder arrestor (protecting device) should be checked at regular intervals.
- All emergency response plans in chapter 7 (sec. 7.13) of this report shall be strategically and visibly displayed on the walls of the facility.
- The dispensing pumps and other related accessories should be constantly serviced so as to minimize the level of exposure of staff to petroleum products as well reduce accidents and fire outbreak.
- Speedy evacuation plans shall be included in the building plans for the eventuality of a fire and evacuation signs (Exit) shall be placed at strategic locations in the building. An ample open space around the facility to be identified and mark as mustard point in case of fire emergency.
- In view of the second-hand goods (Panteker) market neighboring the proposed project site, the proponent shall ensure that dry wood and other materials that are liable to catch fire sold in the market are not stored or piled around the proposed petrol filling station fence. These dry materials are capable of causing disaster in an even of fire outbreak from the uncontrolled market.
- Procedures to follow in the case of fire shall be displayed along corridors, individual offices and public ways to ensure safe and speedy evacuation of personnel visitors.

Impact before mitigation	**High**	**Residual Impact**	**Minor**

6.3.8 Environmental Health and Safety Management

Occupational health is a major consideration in the facility due to the nature of the products and derivative wastes. These include the highly flammable liquid fuels and toxic used oils amongst others. Used oils are also toxic and must be handled with care and provision of protective clothing.

Mitigation Measures

Since long exposure to vehicular emissions may result in irreversible effects on human health, it is advisable that the proponent should ensure that:-

- Ensure all the workers have personal protective equipment
- The first-aid box should be provided and should be made accessible to all staff.
- Hazardous materials to be stored separately from the rest, with appropriate hazard warning signs posted on at their location
- Good housekeeping practices to minimize incidents.
- Use proper techniques for removal of spilled toxic materials.
- Develop a health and safety plan for the facility
- Employees undergo regular medical check-ups (every six months)
- Vehicles are switched off to minimize emissions
- Proper aeration within the premises
- Employ the services of a consultant who will be responsible for coordinating Environmental Health e.g. air pollution control, water pollution control, solid and hazardous waste management etc. in the station.
- Develop a contingency plan to guide the operation of the station.
- In view of the proximity of the proposed filling station to residential houses, the proponent has marked out an access road to be demarked by a fence wall of not less than 3 meters height to serve as a barrier between the proposed filling station and residential houses.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.9 Noise Pollution

Noise is an unwanted/undesirable sound that can affect job performance safety, and health, psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.

Mitigation Measures

During the project operation phase, a number of actions shall be taken to reduce noise levels from operational activities within the site.

- Workers at generator house shall be issued with ear muffs to protect their hearing from any high noise levels.
- All applicable Occupational Safety and Health Administration regulation requirements shall be followed.

- It is likely that there will be no measurable increase in noise levels from increased traffic at sensitive receptors along roadways leading to the site.
- Power generating sets shall be soundproof, place at a safe distance to minimize the impacts of noise to any nearby residential building not exceeding 50dbA.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.3.10 Increase Traffic

An effective traffic control management must be ensured by the management for the control of vehicular traffic in out of the station during construction and operation.

Mitigation Measures

- It should be boldly written on a sign post at least 250 meters away 'SLOW DOWN YOU ARE APPROACHING' "A CONSTRUCTION SITE" (during construction) and "FILLING STATION" (during operation) along the major road. Other signs such as 'NO PARKING' "KEEP MOVING".
- There shall be speed bumps on the road to slow down speeding vehicles that may cause accidents when vehicles wish to turn into the filling station.
- The management shall set up a common transport system for her employees with a view to encourage mass transport.

Impact before mitigation	**High**	**Residual Impact**	**Minor**

6.3.11 Socio Economics

The neighborhood should be considered for unskilled labour, such as laborers and security guards.

As part of the company's corporate social responsibility, the proponent should always liaise with the neighborhood for any assistant especially in the provision of good portable water supply, access roads/drainages and school/health care facilities.

Mitigation Measures

JRB Oil & Gas Limited shall develop and implement decommissioning and rehabilitation plan to protect public health and safety.

A comprehensive plan shall be placed to ensure the smooth closing down of the filling station with consideration of the socio-economic impacts.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.3.12 Security

Security is a fundamental aspect to consider in any development. Good security ensures that materials and equipment are not stolen or vandalized from site and that construction and operational activities are not disrupted with during the normal working and operational hours.

Mitigation Measures

24 hours security shall be provided within the premises during construction and operational periods.

- A site office should be constructed on site to store materials and equipment while not in use.
- The site should be enclosed using suitable walls to beef-up security and to control movement in and out of the site.
- Lighting as well security alarms should be installed on site during construction and operation.
- There should be security guards on the site from a reputable company to monitor movement of people in and out of the project site.
- The company should install an internal surveillance system that will monitor the station at all times.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.3.13 Micro Climate Modification

Mitigation Measures

The design shall ensure that the area within the site planted with grass and flowers to give the facility environment some beauty and coolness.

The designing of the petrol station shall take careful consideration to ensure that areas outside the perimeter wall are planted with sort indigenous trees and flowers to reduce the heat and for beauty of the surrounding.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.4 Decommissioning

Description of the project's decommissioning activities

- **Demolition works:** Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas and perimeter fence a lot of solid waste will be demolished. The wastes should be reused or if not reusable, disposed of appropriately by a licensed waste disposal company.

- **Dismantling of equipment and fixtures:** All equipment including electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of this equipment in other projects. This will be achieved through auctioning of the equipment to other contractors or reused in another site.
- **Site restoration:** Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

6.4.1 Air Quality

Mitigation Measures

JRB Oil & Gas Limited shall ensure that all storage, refueling and refilling facilities (fixtures) are properly capped or disabled.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

6.4.2 Waste Generation

Mitigation Measures

Restoration measures will be assessed and the appropriate local authorities consulted.

The site will be cleared and restored.

All uninstalled equipment shall be carefully dismantled, disposed in an environmentally safely manner. The useful ones shall be given out for re-use or recycled.

Impact before mitigation	**Medium**	**Residual Impact**	**Minor**

6.4.3 Socio Economy

Mitigation Measures

JRB Oil & Gas Limited shall develop and implement decommissioning and rehabilitation plan to protect public health safety.

A Comprehensive plan of the filling station with consideration of the socio-economic impacts.

Impact before mitigation	**Low**	**Residual Impact**	**Minor**

CHAPTER SEVEN

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 Background

The effective management of environmental issues by an organization is a measure of its efficiency from the environmental perspective. By and large what determines such efficiency depends squarely on that organization EMP and strict compliance to it in post commissioning period. It is therefore important for regulatory agencies to ensure that projects are monitored from construction to operation so as to ensure compliance to environmental standards and guidelines as well as the mitigation measures recommended in facility post- EIA approved report.

This plan covers both construction and operational phases and divided into the following sections:

1. Policy
2. Environmental Objectives
3. Organization and Responsibilities
4. Sequence of Construction Activities
5. Water Quality and Erosion Control
6. Air Quality
7. Constructions: Health and Safety Plan
8. Training, Awareness and Competence
9. Communication
10. Operational Safety and Health
11. Emergency Preparedness and Response
12. Monitoring and Measurement
13. Environmental Health and Safety
14. Cathodic Protection
15. Records
16. Environmental System and Audit
17. Management Review
18. Continuous Improvement Plan
19. Decommissioning/Closure.

7.2 Policy

The management policy of this development shall consistently in its operations ensure a clean and safe environment within the site and support of environmental management initiatives both within and outside the project through proactive and responsible activities. It will ensure compliance with the

relevant laws and Regulations governing the management of the environment for various aspects of operations.

7.3 Objectives

The overall goals of this Environmental Management Plan (EMP) are:

- To promote best environmental practices and achieve the goal of waste reduction.
- To mitigate the potential impact of the construction and operational phases of the proposed project on the ecosystem.
- To comply with Nigerian Laws and International laws/conventions with regards to conservation of the environment.
- Integrate environment fully into business.
- Rationalize and streamline environmental activities to add value to efficiency and effectiveness.
- Achieve, enhance and demonstrate sound environmental performance built around the principle of continuous improvements.
- Provide standards for overall planning, operation, audit and review.
- The health, Safety and Environment efforts of the company are set at international standards and are closely monitored by national environmental authorities. The JRB Oil & Gas Limited strategic plan also identifies the establishment of an Environmental Management Team to provide regional leadership in managing, researching an environmental sustainability.

The Environment Policy commits the company to achieve the following goals, in line with the Strategic Plan:

- Develop and promote a culture of environmental leadership, responsibility and continual improvement across the JRB Oil & Gas Limited community.
- Audit, monitor and ensure compliance with the company's environmental legislative and regulatory obligations and other environmental commitments.
- Utilize the resources of JRB Oil & Gas Limited to lead the way in defining and achieving best environmental practice; and Advance and disseminate environmental knowledge and applied environmental management through enlightenment, research and engagement with the wider community.
- Assignment of roles and responsibilities to appropriate personnel to ensure effective EMP implementation.

7.3.1 Scope of Environmental Monitoring Plan

The scope of an environmental monitoring plan normally will cover the entire facility and include the following activities:

- Data collection and analysis
- Assessment and determination of the degree of environmental impacts of facility operations.
- Provide appropriate measures to identified problems from the monitoring exercise.
- Formulation of remediation implementation plan.
- Supervision of plan implementation.

7.4 Methodology of Monitoring

The method for monitoring of project operation will be as follows:

- Monitoring must be conducted by accredited independent consultants engaged by the facility managers.
- Monitoring report to be prepared and submitted to the regulatory agencies for review, comments and approval as the case may be ensuring the adoption of standard procedure in data collection and analysis as well as impact assessment and recommendation of appropriate technology.
- As part of project post-commissioning monitoring, the management of the petrol filling station shall submit to the NMDPRA and the FMEnv, twice a year environmental monitoring report during the site preparation and construction phases and on annual basis for a minimum of five (5) years after the project/activity/action completion phase.

7.5 Socio-Economic Monitoring

The following social indicators shall be monitored:

- Number of employees drown from the host communities;
- Social amenities being executed by JRB Oil & Gas Limited;

Nature of the interaction of JRB Oil & Gas Limited management and workers with host community, and residual or indirect effects of the projects on the socio-cultural behavior of the host communities.

Most Community Development (CD) projects arise out of Participatory Rural Appraisal (PRA) exercises. The EMT shall ensure that in implementing the provisions of this EMP, development projects arising from PRAs do not conflict with the development programmes of government authorities, NGOs

and aid agencies within the POP plant Project area. The EMT shall integrate whatever projects that will arise from the PRA for this project area with the community development programmes.

Most Community Development (CD) projects arise out of Participatory Rural Appraisal (PRA) exercises. The EMT shall ensure that in implementing the provisions of this EMP, development projects arising from PRAs do not conflict with the development programmes of government authorities, NGOs and aid agencies within the POP plant Project area. The EMT shall integrate whatever projects that will arise from the PRA for this project area with the community development programmes.

7.6 Regulatory Compliance

All environment-related regulations as they apply to JRB petrol filling station Project have been documented and described in this EIA. The project management shall ensure compliance with these regulations throughout the project's lifecycle.

7.7 Climate Change Mitigation and Adaptation measure.

As part of the management compliance with both national and internationally regulatory standards bordering on climate change mitigation and adaptation strategies are being put in place in the implementation of this project. The following strategies are considered, however not limited to;-

- Reducing and stabilization of heat trapping greenhouse gases emissions into the atmosphere by reducing the burning fossil fuels and enhancing the carbon sink (afforestation-tree planting) that accumulate and store these gases. In a bit to achieve the National Determine Contribution, concerted effort shall be made to use other alternatives power source (National grid, solar and gas turbine) in order not to total dependence on the diesel power generator to reduce the carbon footprint of the project on the environment.
- Adaptation measure shall include an increasing capacity of the company to cope with changes in the climate. This is aim at reducing the vulnerability to harmful effect of climate change such building flood defenses, plan for heat waves and higher temperatures, installation of water permeable pavements to better deal with floods, storm water and to improve water storage/usage.

7.8 Sequence of Activities

There shall be upgrade of some existing roads and construction of new access roads. Roads used by the project shall be maintained during construction and any damage to roads caused by the project shall be rectified. All roads shall be restored to a condition at least as good as that existing before the project.

The general sequence of activities shall include:

- The preparation of plans in accordance with obligations and the submission to the project Manager for discussions and approvals.
- The construction of sediment and population control measures prior to major earthworks.
- Site clearing and commencement of earthworks and construction of structures.
- Site rehabilitation where required.

The first step in the sequence of operations shall be to plan the environmental management activities as well as the construction activities. In general, the sequence shall require the contractor to:

- Prepare erosion and sediment control plans.
- Minimize noise generated by construction.
- Prepare chemical incident management procedures.

In practice, this shall lead to the following during construction:

- Drainage works, sediment traps and related structures shall be installed prior to major earthworks taking place and prior to storage of harmful chemicals.
- All sediment and erosion control structures shall be inspected regularly and maintained or cleaned out to ensure effectiveness.
- Water carts shall be used for dust suppression in appropriate areas.
- Appropriate maintenance of engines (generators, trucks, heavy machinery).

7.8.1 Construction Health and Safety Plan

The main public health consideration during the project construction shall relate to controlling introduction of new diseases in the area especially sexually transmitted diseases (STDs) and outbreaks of malaria. The project contractor shall be required to prepare and implement a health and safety plan which shall address the following components:

7.8.2 Pre-employment Medical Screening

This shall be carried out or all workers national or foreign employed on the project site. Health records shall be maintained for each worker. The following aspects shall be covered by the screening.

- General physical examination to determine fitness, gross defects and past health problems.
- Radiological examination: strongly recommended for all workers with pulmonary health problems.
- Examination for detection of STDs, if any is suspected.
- Test for occupational hazards: concerns workers anticipated to be assigned to hazardous/precision works. Additional tests shall include hearing, visual acuity heart condition, dexterity, blood and urine examination.

7.8.3 Workers Safety

The following measures shall be implemented.

- Elaboration and enforcement of safety regulations and measures in construction site and on roads in the immediate project area.
- Implementation of medical facilities on site viz-first aid boxes, stand by Ambulance and trained medical personnel.
- Implementation of an emergency evacuation procedure in case of serious health/accident problems which cannot be managed on site.
- Follow up curative treatment for every worker subject to identified health problems such as malaria, respiratory diseases, digestive track disease, intestinal parasite and STDs.

1. Safety Awareness
   a. The site manager or his absence the HSE Manager is basically the custodians of safety.
   b. All management and staff are expected to be highly conscious of safety and hence any hazard shall be reported promptly. Reporting accidents that "almost happened" enhances safety awareness. Prevention is always better than cure. These points are to be highlighted during all staff orientation/awareness forum.

2. Site Management and Staff Safety Duties:

Hazard-Spotting Checklist

i. Falling: Check for:

- Spillage
- Trailing Wires.
- Obstructions.
- Climbing on moving carelessly e.g. Chairs, boxes etc.
- Rushing or moving carelessly e.g. construction workers rushing to the clocking machine at the close of the day.
- Use of unsuitable shoes.

ii. Burns and Scalds: Check for:

- Untagged steam pipes.
- Leaking steam valves.
- Uncovered steam emissions permitted without ensuring that other operations can proceed without scalding.
- Worker's hair in danger because it is hanging loose.

iii. Cuts: Check for:

- Glassware being roughly handled.
- Broken glassware not properly cleaned from the work floor
- Unsuitable or defective tools being used for jobs.

iv. Fire: Check that:

- Smoking is carried out only in authorized areas and cigarettes ends are perfectly put out.
- Suitable extinguishers are in their correct places at all times.
- Exits and routes are kept clear.
- Emergency instructions are understood and unsecured.
- All fire alarm circuits and systems are in good working order.

v. Electrical: Check that

- Wiring is not allowed to become wet because of unclear spillage on the bench or floor.
- Wirings are in good conditions.
- Correct wire gauge is in use in circuits.
- Plugs are not overloaded.
- Wires are not exposed and/or badly patched.

vi. Warehouse (Storage): Check that:

- Stocks are stacked safely and segregated.
- Adhere to "no smoking" rule.
- Lifts and Trucks are rightly put to use and no over-speeding.
- All staff are aware of emergency procedures.
- Temperature and ventilation conditions are satisfactory.

vii. Equipment: Check that:

- All working equipments are housed properly and in good order.
- All protective equipments are treated with delicacy.
- Eye protection, hand gloves, nose covers are used where they are necessary.

viii. First Aid: Check that:

All first aid equipment e.g. Eye Wash bowls; breathing apparatus, etc are in good working order.

- First aid suppliers are complete and adequate.
- Good quality first aid materials are used.
- First aid boxes are located at strategic points.
- Awareness on the use of first aid materials is created among staff.
- Serious cases are taken are taken to the clinic.
- More serious cases are taken to one of the retained hospitals in town by the ambulance on standby duty.

ix. Working at Heights

Falls from elevation associated with working with ladders, scaffolding, and partially build or demolished structures are among the most common cause of fatal or permanent disabling injury at construction sites.

JRB Oil & Gas Limited shall and require that contractors implement the following fall prevention and protection measures for all workers exposed to the hazard o falling more than two meters:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area.
- Proper use of ladders and scaffolds by trained employees.
- Use of fall prevention devices, including safety belts and lanyard travel limiting devices to prevent access to fall hazard area, or fall devices such as full body harness used in conjunction with shock absorbing lanyards

or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines.

- Appropriate training in use, serviceability, and integrity of the necessary PPE; and
- Inclusion of rescue and/or recovery plans, and equipment to respond workers after an arrested fall.
- Use temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged.

x. Hazard of falling object

Ways an employer can help mitigate the risk and injury associated with falling objects.

- Provide warning and precautionary signs
  JRB Oil & Gas Limited shall provide adequate warning for both the employee and other people who may enter the jobsite. Ways to do this include verbally communicating the hazard and by placing of signage that states beware of falling equipment. Another way to ensure safety of guest on the jobsite is to have an employee in charge of escorting them who is aware of areas that have potential for falling objects. The employee can then try navigating the guest's route around those hazards.

- Secure loads
  JRB Oil & Gas Limited shall make sure the load is properly secure. In cases of lifting a pallet with stacks of boxes plastic wrap can provide stability and keep objects from falling. If using plastic wrap don't forget that plastic may stretch due to the high heat at the top of the racks and may cause the load to shift. For heavier loads employees can use metal or cloth straps to secure.

- Properly move load
  When moving a load, it is important to never lift, lower or swing a load over anyone's head. In areas where loads are being placed on high shelves with the potential to tumble over the other side ensure you have a spotter in place that keeps employees from entering the backside hazard and that can help instruct the employee placing the load. If

possible, restrict these stacking and heavy moving operations to hours when fewer people are present.

- Keep a clean worksite
  Tools and debris are one of the main causes of falling objects. To mitigate this hazard employees, need to ensure the work is clean and tidy. When a worker is done using a tool, they need to put in the proper storage area, if they have made a mess or created debris, they need to clean it up immediately.

- Administrative controls
  Administrative controls are a great way to prevent or stop falling objects in the workplace. Examples of these types of controls include the installation of boards on the sides of elevated work areas or scaffolds to prevent objects from falling over the edge, the usage of bars across storage areas to keep materials from tumbling out, the usage of nets to capture falling objects, the implementation of fences or other barricades to keep workers and guest out of fall zones and scheduling work for a time when the amount of people at lower levels is at a minimum.

- Protective Equipment
  When all else fails the last line of defense is personal protective equipment. Anyone who is going to be in an area where to potential for falling objects hazards exist needs to wear a hard hat and steel toed shoes. Both of these pieces of equipment must be inspected before use and be in proper working condition and fit properly. All employees are required to provide employees with Personal Protective Equipment.

xi. Machinery, petrol station and Equipment

This section covers the different safety aspects of using machinery and maintaining petrol station and equipment in the workplace. Employers should consider how their workers use machinery, and adequate maintenance arrangements in place to ensure it remain safe to use.
Dos and don'ts of petrol station and equipment maintenance.

What to do

- Ensure maintenance is carried out by a competent person (someone who has the necessary skills, knowledge and experience to carry out the work safely)
- Maintain petrol station and equipment regularly – use the manufacturer's maintenance instructions as a guide, particularly if there are safety-critical features
- Have a procedure that allows workers to report damaged or faulty equipment
- Provide the proper tools for the maintenance person
- Schedule maintenance to minimize the risk to other workers and the maintenance person wherever possible
- Make sure maintenance is done safely, that machines and moving parts are isolated or locked and that flammable/explosive/toxic materials are dealt with properly.

What not to do

- Ignore maintenance
- Ignore reports of damaged or unsafe equipment
- Use faulty or damage equipment.

xii. General safety wear

Safety/protective wears such as coveralls, head gears, safety boots, hand gloves, eye goggles shall be supplied whenever their use is essential. Workers shall be made to wear them.

7.8.4 Water Supply

Water working on site shall be provided with clean and potable water satisfying recommended guidelines of WHO for drinking water and national standards. If necessary, water source shall be protected from any pollution risk from animals or human origin. Regular control of water quality shall be carried out.

7.8.5 Sanitation

In order to preserve the contamination of surface water by human waste and the transmission of water related diseases, sanitation facilities shall be provided on work site. Facilities shall be in conformity with WHO recommended technologies (at least VIP latrine type) and with a ratio of one toilet facility for no more than 20 workers. The designed capacity of the

facilities shall have to accommodate the expected load over the full construction period. A maintenance program of the facilities shall be in place.

7.8.6 Domestic Waste

Solid waste from domestic origin shall be collected on a regular basis from work sites to avoid the development of unhealthy conditions and the proliferation of insects. An appropriate area shall be designated for the safe disposal of the waste. The area shall be developed in such a way to avoid the pollution of surface water by run-off and the pollution o any underground source of drinking water by the leachate.

7.9 Training Awareness and Competence

7.9.1 Trade Competency

All personnel required to operate or work with any equipment at the proposed filling station must be competent, be tested for each equipment that he/she shall be operating.

All personnel who as part of their profession require be licensing or certifying must obtain the necessary certification before he/she will be allowed to work in the facility.

7.9.2 Fitness

All personnel who shall work in the filling station shall be require to be certified medically fit to do so by an approved medical facility or Medical Doctor (Pre-employment medical examination).
All food handlers if any shall undergo an annual medical check-up by an approved medical facility or Medical Doctor.

7.9.3 HSE Training

i. Induction/Orientation Programme
Every employee and subcontractor employees shall undergo mandatory HSE orientation/induction. The purpose of the induction is to educate workers and make them aware of the major potential hazards they shall come into contact with while working in the petrol station. The new employees shall be provided with a handbook, which outlines the basic Health and Safety rules expected from them.

The content of the HSE orientation/induction will cover the following subjects.

- Filling station safety rules.
- Personnel protective equipment requirements (PPE).
- Environmental sensitive and protection.
- Preparation and planning of the job (Daily Pre-task talk).
- Emergency signals and muster points.

ii. HSE Awareness Programme

A HSE Awareness Programme shall be developed by the HSE Department of the petrol station including course titles, duration and dates, targeted employees.

7.10 Communication

With regards to the dissemination of information related to the environment between the various levels and functions of the filling station, the management shall establish and maintain information, in paper and/or electronic form, to describe the core elements of its Policy on Environment and make the retrieval of such information available to all concerned staff.

7.11 Operational Control

i. The highest ranked personnel in the facility (Facility Manager) shall have overall responsibility for environmental matters.
ii. There shall be an Environmental Committee consisting of personnel from departments/sections whose activities have a bearing on the environment. The committee shall meet periodically to review the environmental performance of the facility.
iii. Accidents and Contingency Plan.

The Facility Manager shall be responsible for all emergencies and contingency response. All emergencies shall be addressed to him or, in his absence, to the **HSE Manager**. The facility Manager shall telephone the nearest State Emergency Response Agency, the Fire Service, the Police Command, Federal Ministry of Environment, Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA).

A separate manual on contingency plan and emergency response shall be in place at the facility.

iv. Monitoring of Operations

a. The HSE Manager shall monitor a measure on a regular basis the key environmental characteristics of the facility operations and activities.
b. He shall keep a record of the status of the facility's compliance with Federal Environmental Legislation and Regulations and any other MOU or legal instruments related to the project.
c. He shall establish and maintain a periodic program of Environmental Audit Reporting.
d. He shall periodically disseminate information relating to the environment among all relevant departments of the facility.
e. He shall store all data relevant to the environment so that they are easily retrievable.

7.12 Operational Safety & Health

I. OPERATIONAL CODE

7.12.1 Goals and Objective

To prevent industrial accidents and hazards.

To promote good health and welfare of all staff so as to enhance high productivity.

7.12.2 General Causal Factors of Industrial Accidents

Handling Accidents: Faulty lifting techniques, heavy load; Failure to wear personal protective equipment.

Falls: Defective ladders; Unsuitable foot wears; insufficient lighting; badly maintained steps and stairs; Obstructions; Rushing; Trailing Wires and Spillage.

Striking Against Objects: Collision accidents caused by overcrowding; Obstructions.

Falling Objects: Badly stacked materials, carelessness in loading or unloading materials.

Machinery in Motion: Over speeding of vehicles and testing of Trucks within the petrol station premises.

Driving in unauthorized areas.

Electrical Accidents: Faulty earthing system; Exposed wires.

Burning/Explosion: Misuse of gas equipment; cutting or welding of vessels containing flammable vapour or liquid; broken hot water or steam pipe or broken insulation material; explosive dust and air suspension.

JRB Oil & Gas Limited shall and require that contractors implement the following fall prevention and protection measure for all workers exposed to the hazard of falling more than two meters:

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area.
- Proper use of ladders and scaffolds by trained employees;
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines;
- Appropriate training in use, serviceability, and integrity of the necessary PPE; and
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall.
- Use temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged.

7.12.3 Fire in Industries

1. Sources

a. Malicious Ignition
b. Misused, Overload and Faulty electrical installation
c. Oxy-acetylene cutting equipment
d. Smoking materials.
e. Oil appliances and installations.
f. Mechanical heat and sparks
g. Gas appliances and installations.
h. Naked lights.
i. Deliberate or uncontrolled rubbish burning.

The fuels these sources can set alight include:

- Waste and rubbish
- Electrical installation
- Flammable liquids e.g. Alcohol
- Packing and wrapping materials.

2. Fire Protection Devices

- A network of Fire Hydrants

- Water Hose Reels and automatic sprinklers
- Fire alarm system
- Fire Extinguishers

These shall be installed at the facility and regular tested to ensure they are functional at all times.

3. Testing/Inspections

The HSE Manager or his designate shall be responsible for the periodic checking of these fire protection devices. A logbook for the inspection of the equipment shall be kept by him. The logbook shall indicate the:

- Date of last servicing
- Date due for servicing
- Date and conditions of the devices
- Name of the personnel who checked the equipment the last time.

(II). OPERATIONAL INSTRUCTIONS

4. Safety Awareness

i. The Facility Manager or in his absence the HSE Managers are basically the custodians of safety.

ii. All Management and Staff are expected to be highly conscious of safety and hence any hazard shall be reported promptly. Reporting accidents that "almost happened" enhances safety awareness. Prevention is always better than cure. These points are to be highlighted during all staff orientation/awareness forum.

5. Management and Staff Safety Duties:

Hazard- Spotting Checklist

I. Falling: Check for

- Spillage
- Training Wires.
- Obstructions.
- Climbing on unsuitable things i.e. chairs, boxes, etc.
- Rushing or moving carelessly e.g. petrol station operatives rushing to the clocking machine at the close of the day.
- Use of unsuitable shoes.

II. Burns and Scalds: Check for:

- Unlagged steam pipes.

- Leaking steam valves.
- Uncovered steam emission permitted without ensuring that other operations can proceed without scalding.
- Worker's hair in danger because it is used for jobs.

III. Cuts: Check for:

- Glassware being roughly handled.
- Broken glassware not properly cleaned from the work.
- Unsuitable or defective tools being used for jobs.

IV. Fire: Check that:

- Smoking is carried out only in authorized areas and cigarettes ends are perfectly put out.
- Suitable extinguishers are in their correct places at all times.
- Exits routes are kept clear.
- Emergency instructions are understood and unobscured.
- All fire alarm circuits and system are in good working order.

V. Electrical: Check that:

- Wiring is not allowed to become wet because of unclear spillage on the bench or floor.
- Wiring is in good conditions.
- Correct wire gauge is in use in circuits.
- Plugs are not overloaded.
- Wires are not exposed and/or badly patched.

VI. Warehouse (Storage) Check that:

- Stocks are stacked safely and segregated.
- Adherence to "no smoking" rule.
- Lifts and trucks are rightly put to use and no over-speeding.
- All staff are aware of emergency procedures.
- Temperature and ventilation conditions are satisfactory.

VII. Equipment: Check that:

- All working equipment are housed properly and in good order.
- All protective equipment is treated with delicacy.
- Eye protection, hand gloves, nose covers are used where they are necessary.

VIII. First Aid: Check that:

- All first aid equipment, e.g. eye wash bowls; Breathing apparatus, etc. are in good working.
- First aid supplies are completed and adequate.
- Good quality first aid materials are used.
- Awareness on the use of first aid is created among staff.
- Serious cases are referred to the clinic.
- More serious cases are taken to one of the retained hospitals in the town by the ambulance on standby duty.

IX. Working at Heights

Falls from elevation associated with working with ladders, scaffolding, and partially build or demolished structures are among the most common cause of fatal or permanent disabling injury at construction sites.

JRB Oil & Gas Limited shall and require that contractors implement the following fall prevention and protection measure for all workers exposed to the hazard of falling more than two meters:

- Installation of guardians with mid-rails and toe boards at the edge of any fall hazard area.
- Proper use of ladders and scaffolds by trained employees;
- Use of all prevention devices, to prevent access to fall hazard area, of fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines;
- Appropriate training in use, serviceability, and integrity of the necessary PPE; and
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall.
- Use temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged.

X. Hazard of falling objects

Ways an employer can help mitigate the risk and injury associated with falling objects.

- Provide Warning and precautionary signs

JRB Oil & Gas Limited shall provide adequate warning for both the employee and other people who may enter the jobsite. Ways to do this include verbally communicating the hazards and by placing of signage that states beware of falling equipment. Another way to ensure safety of guest on the jobsite is to have an employee in charge of escorting them who is aware of the areas that have potential for falling objects. The employee can then try to navigate the guest's route around those hazards.

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JRB Oil & Gas Limited shall make sure the load is properly secure. In case of lifting a pallet with stacks of boxes plastic wrap can provide stability and keep objects from falling. If using plastic wrap don't forget that plastic may stretch due to high heat at the top of the racks and may cause the load to shift. For heavier loads employees can use metal or cloth straps to secure.

- Properly moved load

When moving a load, it is important to never lift or swing a load over anyone's head. In areas where loads are being placed on high shelves with the potential to tumble over the other side ensure you have a spotter in place that keeps employees from entering the backside hazard and that can help instruct the employee placing the load possible, restrict these stacking and heavy moving operations to hours when fewer people are present.

- Keep clean worksite

Tools and debris are one of the main causes of falling objects. To mitigate this hazard employees, need to ensure the work areas is clean and tidy. When workers are done using tool, they need to put it in the proper storage area, if they have made a mess or created debris, they need to clean it up immediately.

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Administrative controls are a great way to prevent or stop falling objects in the workplace. Examples of these types of controls include the installation of boards on the sides of elevated work areas or scaffolds to prevent objects from falling over the edge, the usage of bars across storage areas to keep material from tumbling out, the usage of nets to capture falling objects, the implementation of fences or other barricades to keep workers and guest out of fall zones and scheduling work for a time when the amount of people at lower levels is at a minimum.

- Protective Equipment

When all else fails the last line of defense is personal protective equipment. Anyone who is going to be in an area where to potential for falling object hazards exists needs to wear a hard hat and steel toed shoes. Both of these pieces of equipment must be inspected before use and be in proper working condition and fit properly. All employers are required to provide employees with personal protective equipment.

XI. Machinery, petrol station **and equipment**

This section covers the different safety aspects of using machinery and maintaining petrol station and equipment in the workplace. Employers should consider how their workers use machinery, and have adequate maintenance arrangements in place to ensure it remains safe to use.

Dos and don'ts of petrol station and equipment maintenance

What to do

- Ensure maintenance is carried out by a competent person (someone who has the necessary skills, knowledge and experience to carry out the work safety)
- Maintain petrol station and equipment regular- use the manufacturer's maintenance instructions as a guide, particularly if there are safety-critical features.
- Have a procedure that allows workers to report damaged or faulty equipment.
- Provide the proper tools for the maintenance person
- Schedule maintenance to minimize the risk to other workers and the maintenance person wherever possible.
- Make sure maintenance is done safely, that machines and moving parts are isolated or locked and that flammable/explosive/toxic materials are dealt with properly.

What not to do

- Ignore maintenance
- Ignore reports of damaged or unsafe equipment
- Use faulty or damaged equipment.

7.12.4 General Safety Wear

Safety/protective wears such as coveralls, head gears, safety boots, and gloves, eye goggles shall be supplied whenever their use is essential. Workers shall be made to wear them.

7.13 Emergency Response Plan

The company shall be committed to effectively response to any emergency, which threatens the health and safety of staff, the environment, company assets or operations of this policy are:

- That response to any crisis will be directed toward:
- Saving lives
- Caring for the injured
- Protecting damage to assets
- Close liaison shall be maintained with appropriate government and industry organization and with host communities during emergencies.

7.13.1 Possible Areas of Emergency

- During the off-loading of petroleum products into underground tanks.
- Leaking or faulty product delivery truck.
- A faulty customer's vehicle at the service bay.
- Carelessness from customers or service staff at the bay.
- Overcrowding at service bays with possible brushing of metal containers, this can easily ignite fire.
- Accidental naked light introduced to or from outside the filling station.

Petroleum products are potentially hazardous from the point of production until it has been safely used and the combustion products have been properly disposed of. The term petroleum products describe a range of products which have much in common but also have their differences which affects the approach to safety.

Safety comes from understanding the behavior of petroleum and keeping it under control.

Every uncontrolled release is a hazardous event and should receive urgent attention.

Consumers should be given safety information and having been informed should exercise reasonable care in products handling and use. Good appliance and installation standards are essential for safety.

Emergency Plan, Procedures

Expert hazard evaluation and quantification should form the basis of the emergency plan by:

- Identifying the on-site and off-site hazards.
- Activate already installed emergency alarm.
- Evacuate all people from the danger zone to assemble at the muster point.
- Deploy the fire extinguishers.
- Take note and record source of the emergency.
- Record all losses.
- Take note of areas of flaws in the procedure and effect corrections against future occurrence.
- Assessing the ability for the emergency plans to mitigate the impact of the accident or incident.
- Quantifying the on-site and off-site impact of credible accident scenarios.

The development of the emergency plan should conform to any national or local regulatory requirements.

The emergency plan should provide for an escalating sequence of events and emergency procedures should be tiered accordingly.

Petroleum marketers and suppliers should ensure that the operators fully understand the emergency procedures for the products being carried and that transport vehicles display the appropriate product identification labels to warn and assist emergency response teams.

7.13.2 Contingency Plan and Emergency Procedures

The filling station shall be equipped with:

a. An internal communication/alarm system capable of providing immediate emergency instructions to all personnel.
b. Telephones capable of summoning emergency assistance from local police and fire service department.
c. Portable fire extinguishers, fire control equipment, spill control equipment.
d. Water at adequate volume and pressure to supply water hose streams, automatic sprinklers, or water spray system.
e. First aid materials in boxes.
f. First aid facility on site and a retainer hospital in town.

g. First aid kid shall be provided and placed at strategic locations to allow access during facility construction and operation.
h. Emergency assembly points within the premises.
i. Emergency response arrangement containing details of response bodies and their contact details.

Emergency Plans

- Place appropriate fire extinguishers at strategic locations.
- Train all staff of the station on how to carry out First Aid Treatment and the deployment of emergency appliances, so that in case of an emergency any staff can initiate the emergency response (e.g. fire and oil spill)
- Station manager or his assistant must be available to give proper directives.
- Install a central signs and emergency exits at strategic places.
- Facility owners provide funds for emergency plan.

Fire-fighting Principles, Procedures

- The most effective way to fight filling station fire is to shut off the all supplies.
- Dry powder or carbon dioxide fire extinguishers are effective against fires.
- Water is effective in cooling petroleum products during a fire and in helping to keep the temperature of tanks and their contents below critical levels. Water spray can be useful in protecting fire-fighters attempting to close supply valves in heat-affected areas.
- Emergency response teams drawn from the station staff should represent the first line of defense and should be trained for quick decisive action to contain emergencies before they develop and be trained to assist emergency personnel as any escalation of the emergency demands.
- Emergency response to a fire on or close enough to threaten petroleum products road tankers depends critically on the driver operator. Therefore, the quality of the equipment and training in its use are crucial to recovering control and mitigating the impact of the emergency situation.

Internal, External Responses

Most in-facility emergencies begin in a small way or as a result of failure to deal promptly and effectively with a minor incident. Owners and managers

should recognize the value of rapid response by trained teams confident in their ability to deal with emergencies. Good equipment, a team spirit and regular training are essential for the response.

External response may be from local authority emergency services or from mutual assistance groups set up to response emergencies. The effectiveness of both internal and external response depends initially on the seriousness of the event and then on resources, preparedness and timing. Fire drills and rehearsals for emergencies are an essential part of safety management and should be practiced regularly. External response will be most effective when the team is totally familiar with the petrol station, its hazards and its diseases.

Internal and external communications are important factors in determining the effectiveness of emergency response. The slightest delay in reacting to an emergency can make the difference between success and failure. No one should be criticized for over-reacting to an emergency.

Investigation, Corrective Action, Follow-up

The purpose of post-incident investigation is to determine the causes, both immediate and underlying, in order that lessons can be learned and corrective action taken. The investigating team should include an independent expert and should report to the owners, or to senior management. The licensing authority in this case the NMDPRA shall participate and make an independent investigation.

An investigation may disclose the need for corrective action in respect of petrol station layout, equipment, systems, procedures or personnel. While the team should guard against developing an unrealistic 'wish list' senior management should be prepared to sanction their recommendations.

Senior management should be prepared to discipline anyone who causes or conditions to an incident by disregarding safety rules and procedures. They should also recognize those who respond well in an emergency.

7.13.3 Emergency Coordinator (EC)

The official who shall have the over-all responsibility for coordinating all emergency response measures shall be the Facility Manager, to be designated Emergency Coordinator (EC). He shall be assisted by the HSE Manager and the Security Manager. The emergency coordinator (EC) shall have the authority to commit the resources needed to carry out the contingency plan.

7.13.4 Emergency Procedures

The following procedures shall be implemented in the event of an emergency:

i. Fire:

- Raise alarm
- Contact the emergency coordinator through the phone number
- Use suitable available firefighting device
- Close the doors and windows if outbreak is in a room
- Run to emergency assembly point (Muster Point) through the emergency exits.
- The facility Manager or designate shall contact the fire service and Police command immediately.
- Release trained safety men to combat the emergency
- Instruct everybody not to panic.

ii. Accidents:

- Give first aid if appropriate
- Rush to Facility's retainer Hospital with ambulance (if the case is serious)
- Stop the operation of the machine (if from a machine)
- Report to the Facility Manager and the HSE Manager immediately.

iii. Shocks:

- Switch off control
- Trace training wires and other related problems (by qualified electrician).
- Others, Including Explosions, ammonia Gas release, etc
- Contact the emergency coordinator for appropriate response.

7.13.5 Emergency Coordinator's Response

a. The emergency coordinator (or his assistant in his absence) shall immediately activate the internal facility alarms or communication systems to notify all personnel, and, in the case of fire, the petrol station's Fire Department if needed.
b. Concurrently all emergency response arrangement should be brought to bear on the particular problem on hand.
c. If the emergency involved an incident that could threaten human health or the environment outside the facility, the emergency coordinator must submit a report of his findings to NMDPRA within 24 hours of the incident.
d. The emergency co-coordinator report shall include:
    i. Name and Telephone number of the person who reported the incidents;

ii. Name and address of the filling station
iii. Time and type of incident (e.g. fire, flood disaster);
iv. Name and quantity of material(s) involved to the extent known or estimated.
v. The nature and extend of injuries, if any, and
vi. The possible hazards to human health or the environment outside the facility.

e. If the facility shuts down temporary as a result of the incident the emergency coordinator must monitor leaks, pressure build up, or ruptures in valves, pipes or other equipment whenever this is obtainable.
f. After an emergency occurrence, there should be a post mortem meeting of management.
g. Immediately after an emergency, the emergency coordinator must provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire or explosion at the facility.
h. The facility shall take corrective action to prevent a reoccurrence of the incident.

7.14 Environmental Health and Safety

A health, Safety, and Environmental Management Manual shall be prepared to clearly define the responsibilities and procedures to be implemented throughout project preparation and operation of the facility. Adequate risk assessment and emergency response plans and procedures to handle unforeseen risk and emergencies shall be incorporated in the HSE manual. As part of its community environmental management plan, JRB Oil & Gas Limited shall undertake periodic monitoring and consultation with local communities during operation of the facility to identify any major impacts and implement appropriate actions to mitigate any adverse impacts that may arise.

7.14.1 Health Plan on Drug and Alcohol

The abuse of drugs and alcohol can be injurious to people and impair performance at work.

- The company shall ensure that all employees recognize this fact and aim to minimize associated risk.
- Employees who live on alcohol or drug dependence are encouraged to seek medical advice and follow treatment.
- Punishment for abuse of alcohol or drug is summary dismissal.

- Smoking is injurious to health therefore is prohibited within the company premises.
- The smoking of cigarettes, cigars or pipes is prohibited in the petrol station, hydrocarbon facilities and other designated no-smoking area.

Safety and health plan in handling petroleum retail outlet facilities

Petroleum products facility installations should have a systematic, planed approach as regards safety:

- Regular inspection of the installation. Safety and health plans must be submitted to and approved by the major hazard control authorities.
- Commissioning of loading/unloading procedures, maintenance work, etc.
- Maintenance and Examination.
- Fire precautions and emergency plan
- Operational procedures in writing
- Training of personnel.

The flammability of petroleum products is the most important origin of accidents. Personnel handling these chemicals should be familiar with the hazards and they should be trained in safety procedures, equipment and personal protection. In case of a spillage, inhalation of the gases should be avoided using fresh air, positive pressure helmet or self-contained breathing apparatus. These are the only alternatives of personal protective equipment, as the gases cannot be filtered.

Contact with the cold, evaporating liquid should be prevented. The eyes should be protected whenever the danger of splashing is possible. Liquefied petroleum gases are good solvents of some materials, such as plastics and rubber, which should be considered when choosing protective clothing. Clothes which have been wetted by splashing should be removed without delay: the liquid gases may be trapped in the fibers and evaporate, resulting in a fire hazard when the person enters warmer area, e.g. comes into a warm room from outside.

7.14.2 Earthing

Installation earthing design shall be carried out in the filling station in accordance to (IS 3043 and 1997, sec 31e) or equivalent system recognized by statutory authorities under the petroleum act/electricity Act. All earth

connections should be visible for inspection to the extent possible. Earthing system shall be designed for the following.

- System neutral earthing;
- Protective Equipment Earthing for personnel safety;
- Protection against Static discharges;
- Lightening protection; and
- Earthing for Data Processing system.

The earthing system have an earthing network with required number of earth electrodes connected to it. The following shall be earth:

- System neutral earthing
- Current and potential transformer secondary neutral
- Metallic non-current carrying parts of all electrical apparatus such as transformers, switch gears, motors, lightening/power panels, terminals boxes, control station fixtures, receptacles etc.
- Storage tanks, columns and all other process equipment
- Electrical equipment fencing (e.g transformer)
- Cable shields and amour
- Pump handling hydrocarbons

7.14.3 Cathodic Protection

This is a procedure by which an underground metallic pipe is protected against corrosion. A direct current is impressed onto the pipe by means of a sacrificial anode or a rectifier. Corrosion will be reduced where sufficient current flows onto the pipe.

7.14.4 Types of Cathodic Protection

There are two basic methods of cathodic protection: the galvanic anode system and the impressed current system.

Impressed current systems are normally used for transmission lines. However, if property designed, impressed current can be used on a distribution system.

Galvanic Anode Systems

Anodes are "sized" to meet current requirements of the resistivity of the environment (soil). Anodes are made of materials such as magnesium (Mg), zinc (Zn), or Aluminum (Al). they are usually installed near the pipe and connected to the pipe with an insulated conductor. They are sacrificed (corroded) instead of the pipe.

7.14.5 The need to Catholically Protect Petroleum Distribution System

1. Determine type(s) of pipe in the system: bare steel, coated steel, cast iron, plastic, galvanized steel, ductile iron or other.
2. Date the system was installed (steel pipe installed after July 1, 1971, must be catholically protected in its entirety).

Who installed the pipe? By contacting the contractor and other operators who had pipe installed by the same contractor, operators may be able to obtain valuable information as:

- Type o pipe in the ground.
- If pipe is electrically isolated.
- If the products pipes are in a common trench with other utilities.

3. Pipe location- map/drawing. Locate old construction drawings or current system maps. If no drawings are available, a metallic pipe locator may use.

4. Before the corrosion engineer arrives, it is a good idea to make sure customer maters are electrically insulated. If the system has no meter, check to see if the gas pipe is electrically insulated from house or mobile home piping.

5. Contact an experienced corrosion engineer or consulting firm. Try to complete steps 1 through 4 before contracting a consultant.
6. Use of Consultant

A sample method, which may be used by a consultant to determine cathodic protection needs, is the following:

An initial pipe-to-soil reading will be taken to determine if system is under cathodic protection.

If the system is not under cathodic protection, the consultant should clear underground shorts or any missed meter shorts. (The consultant will probably use a tone test).

After the shorts are cleared, another pipe-to-soil test should be taken. If the system is not under cathodic protection, a current requirement test should be run to determine how much electrical current is needed will vary for each gas system.

Remember to retain copies of all tests run by the corrosion engineer.

7. Cathodic Protection Design

The experienced corrosion engineer or gas consultant, based on the results of testing, will design a cathodic protection system that best suits the piping system.

7.15 Records

The following records shall be kept by the facility Management/Environmental Manager:

Information on applicable environmental guidelines, laws, regulations and public complaints;

- Internal and public complaints;
- Training records;
- Process information;
- Inspection, maintenance and calibration records;
- Pertinent contractor and supplier information;
- Incident reports;
- Emergency preparedness and response procedures;
- Audit reports, findings and recommendations;
- Information shall be stored on paper and electronic form to facilitate the retrieval of such information by all concerned as and when needed;
- Easy to follow procedures for identifying potential hazards, responding to accidents and emergency situations and for preventing and mitigating potential and real sources of impacts on the environment shall be established.

7.16 Environmental Management System Audit

Once every year, an internal audit shall be carried out to determine the extent to which the activities and operations of the filling station have conformed to the requirement of the International Standard ISO 14001 with planned arrangements for its implementation.

7.17 Management Review

- The top management of JRB Oil & Gas Limited shall, at intervals that it deems it fit, review this EMP to ensure its continuing suitability, adequacy and effectiveness.
- The management review will address the possible need for changes to policy, objectives and other elements of the environmental management in light of the findings of the Environmental Impact Assessment and Audit Reports, changing circumstances and the commitment to continual improvement.
- In all the above, the continued advice of the environmental consulting firm is indispensable and statutory.

7.18 Continuous Improvement Plan

In order to continuously improve the environmental performance of the facility, it is imperative that various types of environmental Audits be carried out on its activities. The information provided by these audits is passed on to the management to aid decision making. These types of audits relevant to the proposed facility are indicated in table 7.3.

7.19 Waste Management Plan

JRB Oil & Gas Limited shall have s waste management policy which shall:

Solid wastes

- Construction debris should be collected by a licensed private contracted waste collection
- Excavation waste should be re-used or backfilled.
- Waste generated should be collected by a privately contracted waste collection company and the contractor should ensure the construction of a central point with bulk storage facilities
- The site should have waste receptacles with bulk storage facilities at convenient points to prevent littering during construction.
- Take all practical and reasonable measures to minimize the generation of solid waste.
- Recycle waste especially office paper
- Try to ensure buy back policy
- Waste collection bins should be placed at strategic location within the facility
- Manage and dispose all wastes in line with relevant regulatory requirements and environmentally responsible manner.

Liquid waste

- Sludge from underground tanks should be removed through a closed pumping system. The remaining contents of the tank should be drained through the main drain lines. The sludge should be collected and disposed in an environmentally safe manner.
- Track and maintain records of the full life cycle of waste streams and provide an auditable trait as to its management and disposal.
- Make sure that oily waste water from the filling station is discharge through an oil water separator pit before finally discharge into land or water ways,

- Make sure that spent lubricant should be differentially from other oily effluents and channeled into a source recovery system or into a receptacle.
- Make sure that all the discharged points of oily waste water, solids waste and spent lubricants should be registered with the NMDPRA. This will help in constant monitoring of waste generated and the limits of disposal into land and surface water from the station.

7.20 Oil Spill Contingency Plan (OSCP)

The company is aware of potential impact of its activities on the environment in respect of oil spill to guard against the contamination of soil, water and atmospheric resources within the limit of its operations.

Purpose/Objective

The contingency plan shall be aimed at achieving the following functions:

- Ensure that the environment, personnel and assets are protected.
- To ensure that manpower, equipment and funds are available to effectively contain and clean-up oil spills emanating from the company's operations in a timely and efficient manner
- To maintain good record and accurate information concerning the spill in disseminated to the public and the government is protected. Make sure that poor management of oil spill that will cause damage to the environment is handled properly.

REQUAREMENTS

A. Description of Facilities and Area of Operations

The licensee is to identify beforehand all sensitive areas that should be protected in the event of a spill.

It is mandatory to locate all potential sources of spills from the facility, be able to estimate the size of the spill, determine potential containment sites and try to locate environmentally sensitive areas that need to be protected.

B. Training

The station staff should be given training on oil spill trained on the procedures of and requirements of oil spill control, combat and removal. Certificates of training exercise should be display on the office notice board.

C. Organizational Responsibility

The company shall have an organizational chart of the response team showing the chain of action taken for the control of spill. Also, it should indicate the responsibility of each staff in the control process. The station manager shall be the leader of the respond group.

D. Equipment and Materials

The company shall have in stock within its facility spill response equipment such as; scrappers, plastic buckets, shovels, suction pumps, wheel barrows, head pans and safety gears-gloves, goggles, helmets, boots containment booms, etc.

E. Containment Procedure and clean up

In the event of spill, the containment procedure will depend on the type of product. For PMS which is very volatile and flammable, emphasis should be placed on evacuation of personnel from the site rather than containment. This is because of the low viscosity (high mobility) of PMS and a high possibility of fire outbreak. The place needs to be secured with firefighting trucks before containment should proceed.

On general terms, the following procedures should be adopted.

The following procedure shall be adopted in handling an oil spill incident;

- Clean up all hydrocarbons and chemical spills emanating from the company's operations in a timely and efficient manner.
- Track the oil movement in order to find out which areas are under imminent relative threat.

Alerting Procedure

Central alarm and emergency shutdown system should be activated immediately a spill is discovered.

Relevant emergency agencies such as fire service, police, NEMA, Civil Defense and NMDPRA should be alerted.

Safety Measures

Petroleum products such as PMS, AGO DPK and other flammable hydrocarbons (flashpoint below 38^0C) may present fire/explosion hazard if spilled.

- Installed fire extinguishers at strategic location
- Evacuate people to assembly point

- Naked light and other possible sources (radio and radar equipment) of ignition must be avoided.
- Shut down power source
- Safety handling codes of petroleum products shall be observed by the respond team and shall wear protective clothing-gloves, goggles, boots, helmets and muffles.

F. Control Measures and Communication

- The spill shall be prevented from spreading by containment ditches to be made with diggers, shovels or pay loaders.
- Deploy containment equipment to the proximity of the spill.
- Remove products or oil by suction pumps or buckets.
- Where water ways are under threat, floating absorbent booms shall be installed on water surface.
- For large spill over 20,000 liters, agencies such as the National Oil Spill Detection and Response Agency (NOSDRA), shall be appropriately informed.
- Oil Spillage/leakage Notification Report (Form A) to be completed and submitted within 24 hours of the spill incident. Additional details about the spillage/leakage must be reported within 14 days of the spill incident (Form B) and the oil spillage response/clean up report (Form C) must be completed and submitted within four (4) weeks of the spill incident. All correspondents should be submitted to the Director, NMDPRA.

G. Disposal method

Oil recovered from spill incident should be reuse. If it cannot be recycled, all unwanted oils should be disposed by controlled burning through incineration, land farming and sanitary landfill in an acceptable manner approved by Director, Petroleum Resources.

H. Press Release

I. Documentation of Spill

The facility operator shall keep record of all sources of spills for reference and historical purposes.

J. Rehabilitation and Remediation

- Oil recovered from spill incident shall be reused. If the oil cannot be recycled, it should be disposed through burning (in lined pits), incinerators or land filling.
- Oily solid waste shall be stored in containers that do not allow leakage and disposed in a pit lined with impervious materials such as concrete or high-density poly-ethylene.
- The impacted portion of land shall be remediated with soil free from oil or grease. The land quality levels shall be 50mg of oil per Kg of soil.
- Water sources shall be skimmed or cleaned with detergents, steam and hot water until there is no visible sheen after the first 30 days of the occurrence of the spill.
- When the soil is heavily contaminated, the soil shall be excavated and oil washed into a lined pit at designated site approved by the NMDPRA.
- An Environmental Impact Evaluation assessment shall be carried out in accordance with Article 2.0 of the EGASPIN (PART VII-A).

7.21 Monitoring and Measurement

The management of JRB Oil & Gas Limited Project shall take the following measures to check all operations so as to comply with statutory regulations:

- Internal daily monitoring of critical parameters of its operations.
- Periodic auditing of the facility's compliance to statutory regulations.
- Periodic facility auditing in accordance with regulatory demands.
- Periodic maintenance of machinery/devices with the facility.
- Daily and weekly checking of the performance of machines, devices, fixtures, electricity generation appliances and the connections, sanitary (hygiene) conditions.
- Annual cross-checking of compliance with its Environmental Policy.
- Keeping of periodic stream water monitoring Analysis Results log sheets.
- Keeping of daily solid waste generation and disposal records.
- All employees in the facility shall undergo regular medical check-ups (at least once in a year) to monitor the effects of long exposure to hydrocarbons.

7.21.1 Non-Conformance and Corrective Action

Causes of non-conformation to environmental policy and statutory regulations are identified by:

- The Federal Ministry of Environment (FMEnv)
- Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA)
- Internal Monitoring Unit (Environmental Committee).
- Environmental Consultants (through Environmental Audit Reports, and Environmental Compliance Audits).
- Changes in any of the written procedures shall be communicated to every staff by the Facility Manager.

7.21.2 Responsibility and monitoring

Decommissioning activities and facilitating the funding of those activities will be the obligation and responsibility of JRB Oil & Gas Limited Decommissioning work itself will be performed by competent registered contractors and will be monitored by relevant regulatory organization. The monitoring will occur throughout the project's decommissioning phase. An environmental specialist and / or independent consultants shall be called in periodically to audit the environmental components of the decommissioning effort. Appropriate officials from the FMEnv and NMDPRA shall be the project's decommissioning work to verify its compliance with the applicable regulatory requirements and the terms and conditions contained in the project's legal documents.

7.22 Organization and Responsibilities

The Project Manager of the proposed project shall be directly responsible for the implementation of all environmental management programmes and compliance with safeguards and standards. The main contractor in charge of construction and civil engineering shall nominate a representative (Environmental Officer) with appropriate experience in the field of environment.

Management Responsibility

The Chief Executive Officer of JRB Oil & Gas Limited has the overall responsibility for HSE.

Managers at all levels in the organization are also responsible for HSE in their respective areas of authority. This responsibility includes but not limited to:

- Ensure that the workplace is secured and cleared in accordance with the regulations.

- Identify the causes of and reporting injuries and near-misses putting HSE on the agenda.

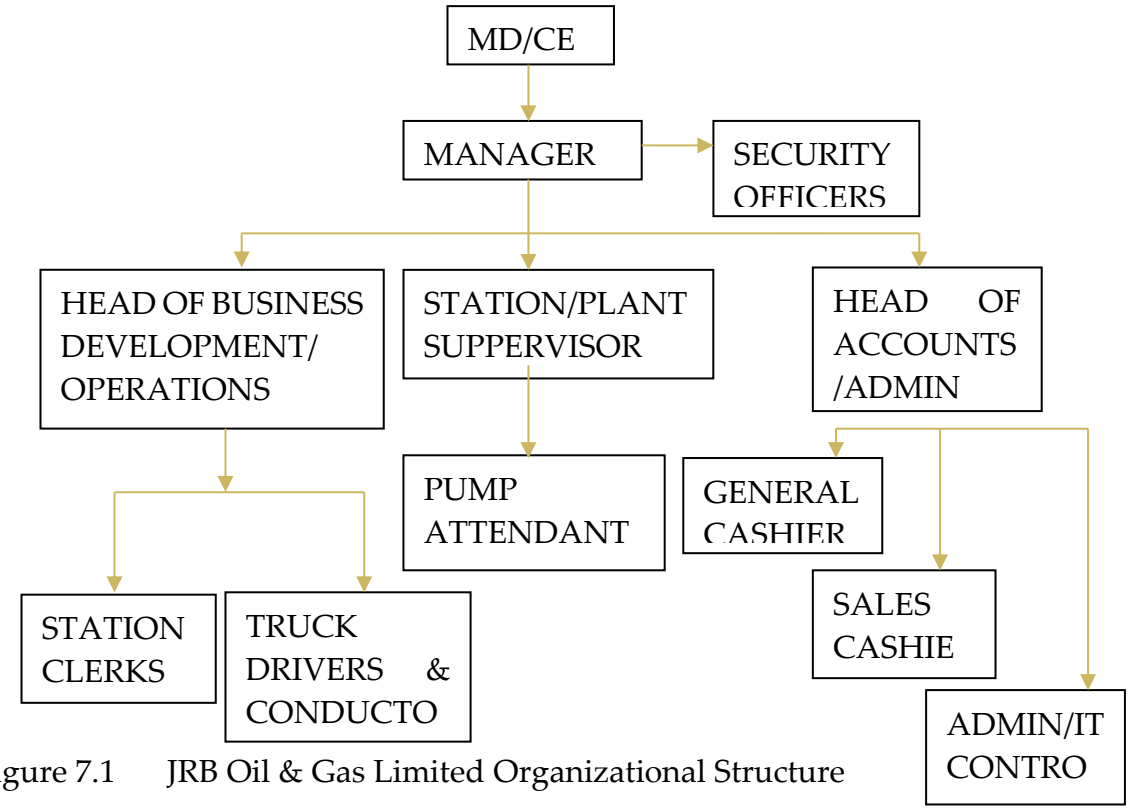

Figure 7.1 JRB Oil & Gas Limited Organizational Structure

Employees' Responsibilities

Each person must:

- Take responsibility for their own health and that of others
- React when dangerous conditions or actions are discovered
- Report undesirable incidents immediately
- Use the prescribed protective equipment.

The main task of the Environmental Officer shall be:

- Monitor environmental activities of the contractor.
- Assist in resolution of non-conformance.
- Identify the need for and recommend corrective actions.
- Report to the project Manager and prepare a monthly report including when required photographic record of implemented environmental protection measures.

7.22.1 Violation of Environmental and Occupational Health Laws

The proposed project site has been given approval from the Local Government Planning Authority as such all environmental laws and regulations have been taken into cognizance. The management of the station shall be charged or fined by the Environmental and occupational health laws.

7.22.2 Public Complaint

JRB Oil & Gas Limited has not so far received any complaints from the general public or its neighbors regarding its proposed move to construct a petrol filling station in the area.

Table 7.2 Monitoring Requirements for EMP

MONITORING SCOPE	PARAMETER	LOCATION	FREQUENCY		RESPONSIBILITY/ACTION PARTY
			CONSTRUCTION	OPERATION	
Air	NO2, SO2, CO, VOC, Particulate matter, Noise	Project area	weekly	weekly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Wastewater and groundwater	TSS, COD, BOD, EC, TDS, Cd, Pb, salinity, THC, TOC, Oil & Grease, DO, etc.	Effluent outlet and boreholes	Monthly	quarterly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Noise	Sound level	Project site	Monthly	Monthly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Solid waste	Sludges, Produced Sand, domestic wastes, empty metals/plastic chemical containers through: waste sorting into bins Removal to dump site Repair & Reuse Recycling	Waste Generation and disposal sites	As generated an as necessary	Bi annual	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Oil/Product Tank Sludge; Oil Sludge	Quantity/weight pH Total Hydrocarbon Content Heavy Metals e.g. NI, Cr^{+6}, Cd, Hg, Pb, Cu, Zn, Fe^{+3} & Ti, LSA/NORM	Project site	Bi weekly		JRB, HSE Unit, FMEnv, NMDPRA, AEPB

Soil	Visual inspection, EC, Moisture, Oil &Grease, THC, Ca^{2+}, Mg^{2+}, K^{+}, Heavy Metals such as Cr, Pb, Cd, Cu & Ni, Zn, Fe etc.	Project site	Bi weekly	Monthly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Public safety, OHS	Signs, culverts, incident, accident records	Project site	Monthly	Annually	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Land acquisition	Compensation, income, housing, employment and social adaptation	Host communities	Middle and end of land acquisition	Annually	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Socio economic benefit	Increased number of tourists, local revenue and increase income of locals	Entire project area	End of land acquisition		JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Community participation	Number of participants	Project communities	Bi annual	Second year	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Increased pressure on available utilities and infrastructure	Boreholes, wells, roads etc	Project communities	Monthly	Yearly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Housekeeping & Facility Inspection/ Maintenance	Clean entire premises Tools arrangement in workshop Inspect all machinery/devices Inspect storage facility		Daily	Daily	
Increased heavy traffic	Visual inspection	Project area	Weekly	Monthly	JRB, HSE Unit, FMEnv, NMDPRA, AEPB
Impact on Vegetation	Loss of vegetative cover leading to		Bi		

	decreased soil quality, waste absorption capacity, ground water control and ground water recharged.				
Impact on Wildlife			Once every 2 years of project life Or As Directed by the NMDPRA Chief Executive	Once every 2 years of project life	

JRB: JRB Oil & Gas Limited
HSE Unit: Health, Safety and Environment Unit
FMEnv: Federal Ministry of Environment
NMDPRA: Nigerian Midstream and Downstream Petroleum Regulatory Authority
AEPB: Abuja Environmental Protection Board

7.23 Decommissioning/ Closure Plan Strategy

When the station facilities have reached the end of its economic and safe operating live the facilities shall be decommissioned. All structures, facilities, such as storage tanks, pump pipes and other related infrastructures shall be dismantled either for recycling, sold for scrap, or disposed of property. The paved or concreted horizon shall be isolated with cement. Decommissioning shall be implemented once decision is made to phase out operation and when each facility is ceased operation and all equipment has been deactivated. Decommission of project is necessary to avoid any adverse effect to the environment.

Table 7.3 Types of Environmental Auditing

Type	Aim	schedule	By whom
Compliance and Product Safety/Process Audit	To establish compliance with standards and legislation	Annually	Environmental Consultants
Site Audit	To assess environmental performance within the neighboring community of the facility	Annually	Environmental Consultants
Environmental Liability Audit	Assess underwriter's risk and opportunities and determine investment policy	Annually	In-house
State of Environmental Audit	Assess underwriter's risk and opportunities and determine investment policy	Annually	Environmental Consultants
Policy Impact Assessment	To review the activities such as services and policies of the environmental protection Agency	Biennially	Environmental Consultants

7.23.1 Abandonment strategy plan

Company shall:

- Obtain permission from regulatory body
- Isolate the area
- Dismantle all the structures (Buildings, tanks, pumps, paved area, etc.)
- Decommissioning exercise shall be in accordance with the appropriate regulations and shall be performed by recognized company and also be monitored by relevant regulatory agencies.

The company under the supervision of registered organization responsible for decommissioning exercise shall develop abandonment risk plan assessment procedures, and other required activities for the station, once the decision is made to cease operations and phase out. All relevant regulatory agencies will be consulted. All areas of the site which has the potential for soil contamination, especially around the tanks shall be carefully monitored to confirm the present or absent of contaminants. All activities pertaining to site remediation, if any, and restoration, will be reviewed and approved by NMDPRA The design of all buildings and infrastructural facilities will include abandonment and decommissioning strategy, in which all the equipment and materials can be taken out of the station with little or no damage to the existing structures, to avoid contamination of the site. The premises will then be situated for conversion to other viable uses in the future.

7.23.2 End of project operation phase

Removal techniques

Once the tanks have been withdrawn from the site, they are either taken for recycled at a scrap metal dealer or disposed at an industrial or hazardous waste landfill. The following techniques shall be employed during removal of tanks. All flammable or combustible liquids from the tanks and connecting lines should be removed.

Tanks piping and opening should be disconnected. Section of connecting lines should be removed and tanks openings should be cap or plugged.

The tanks should be gas-freed on site if it can be done safely or should be transported to safe location and gas-freed.

The tanks should be retested for flammables before disposal and rendered gas free. A sufficient number of holes or openings should be made in the tanks to render them unfit for further use.

7.23.3 Tanks Disposal by Recycling

For many reasons, the recycling of old steel tanks as scrap metal is the most desirable form of tank disposal. The recycling of tank steel is the most environmentally desirable method of tank disposal, since the steel is never, in fact, land-disposed but is melted down for recasting into other products. Heavy metals that may be of concern in land disposal become air contaminants in the steelmaking furnace; these are removed before emission and can be treated as part of hazardous solid waste.

7.23.4 Pump Stations/ Building Structure

Equipment from the pump shall be dismantled, recycled, or disposed of in compliance with applicable regulations. Reusable components shall be reconditioned or recycled for future use. The buildings shall be demolished (the foundation will be broken up) and disposed properly for other potential uses. The land surface will be recon toured and appropriate vegetation will be planted to prevent soil erosion.

7.23.5 Disposal of contaminated materials and residues

Each site with the potential for hydrocarbon contamination shall be identified, characterized, and assessed for contamination. Contaminated soils shall be removed and replaced with clean fill or remediated in place in accordance with applicable regulations and standard industry practices in place at the time of actual decommissioning. Remediation and/ or treatment methods shall be selected based on proven and effective technologies that shall minimize or eliminate the potential for further contamination of the environment.

Containers such as empty drums, portable tanks, and storage bins shall be return to vendors; cleaned and recycled; cleaned and crushed for scrap; or land filled. Fluids and/ or sludge from process vessels, storage tanks, and the pipeline will be recovered and properly disposed. Any hazardous materials will be packaged, labeled, and taken to the project's hazardous waste facility for disposal. Project solid waste landfills will comply with a final closure plan.

7.23.6 Remediation Plan

A remediation plan shall be submitted to the Nigerian Midstream and Downstream Petroleum Regulatory Authority before the cessation of activities at the filling station. The remediation Plan shall:

Nominate the end use(s) of all lands affected by the filling station project.

Nominate the use(s) of all buildings and other petrol station infrastructure components; Describe the steps to make the area safe;
Described the type and duration of post decommissioning monitoring.

The fate for each of the project infrastructure listed will be dependent upon the nominated end land uses, which will be agreed with the local community and the federal government agencies. These items will then be set out in detail within the final remediation plan to be presented to the Federal Ministry of Environment before the cessation of activities.

CHAPTER EIGHT

8.0 Conclusion

Operational Phase

On completion of the project the following should be adequately provided:

Fire exit, fire extinguishers, hazards warnings, fire alarm, refuse collection chamber, mechanism for regular cleaning of facility and any necessary measures as may be necessary to safeguard the health and safety of the general public. The buildings should also have elaborated evacuation procedures and emergency response plan.

Decommissioning

Safety measures necessary during decommissioning (in case of demolition) are: -

Use of proper equipment and tools

Supervision by competent engineers

Provision of adequate PPE to all demolition workers

Proper handling and disposal of debris

Full compliance with Occupational Health and Safety Act or any other law applicable at the time of demolition.

Working Conditions

The need for good working conditions cannot be over emphasized. The proponent must ensure that all laid down regulations are adhered to in accordance with the employment Act, and related labour laws in the country.

Although the facility has few environmental shortcomings that may potentially impact negatively on the environment to a certain extent in the long run, strict compliance to the recommended mitigation measures will undoubtedly forestall any potential environmental impacts at this stage of facility's operation.

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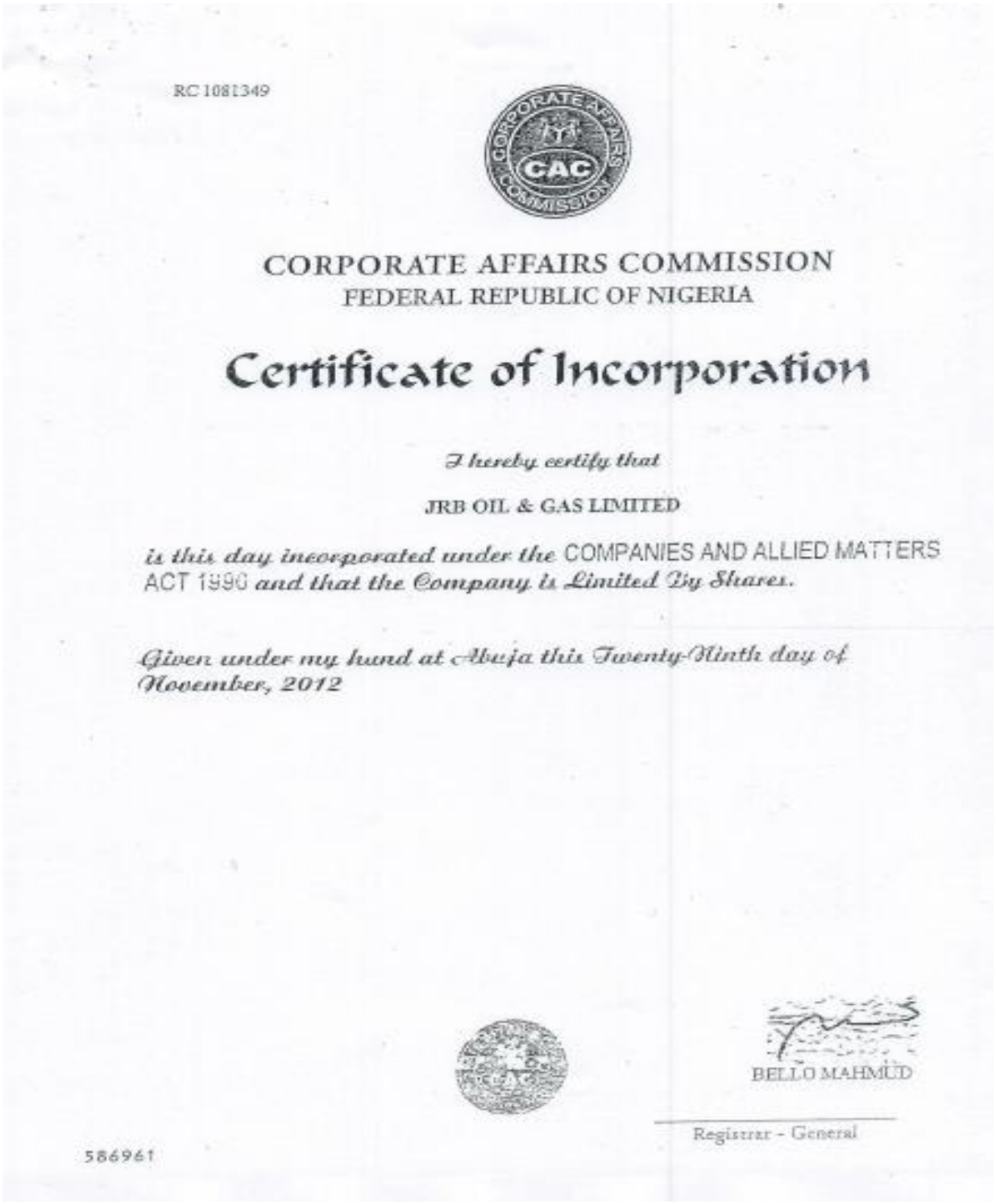
Appendix

Appendix 1: JRB Oil & Gas CAC Certificate



RC 1081349

CORPORATE AFFAIRS COMMISSION
FEDERAL REPUBLIC OF NIGERIA

Certificate of Incorporation

I hereby certify that

JRB OIL & GAS LIMITED

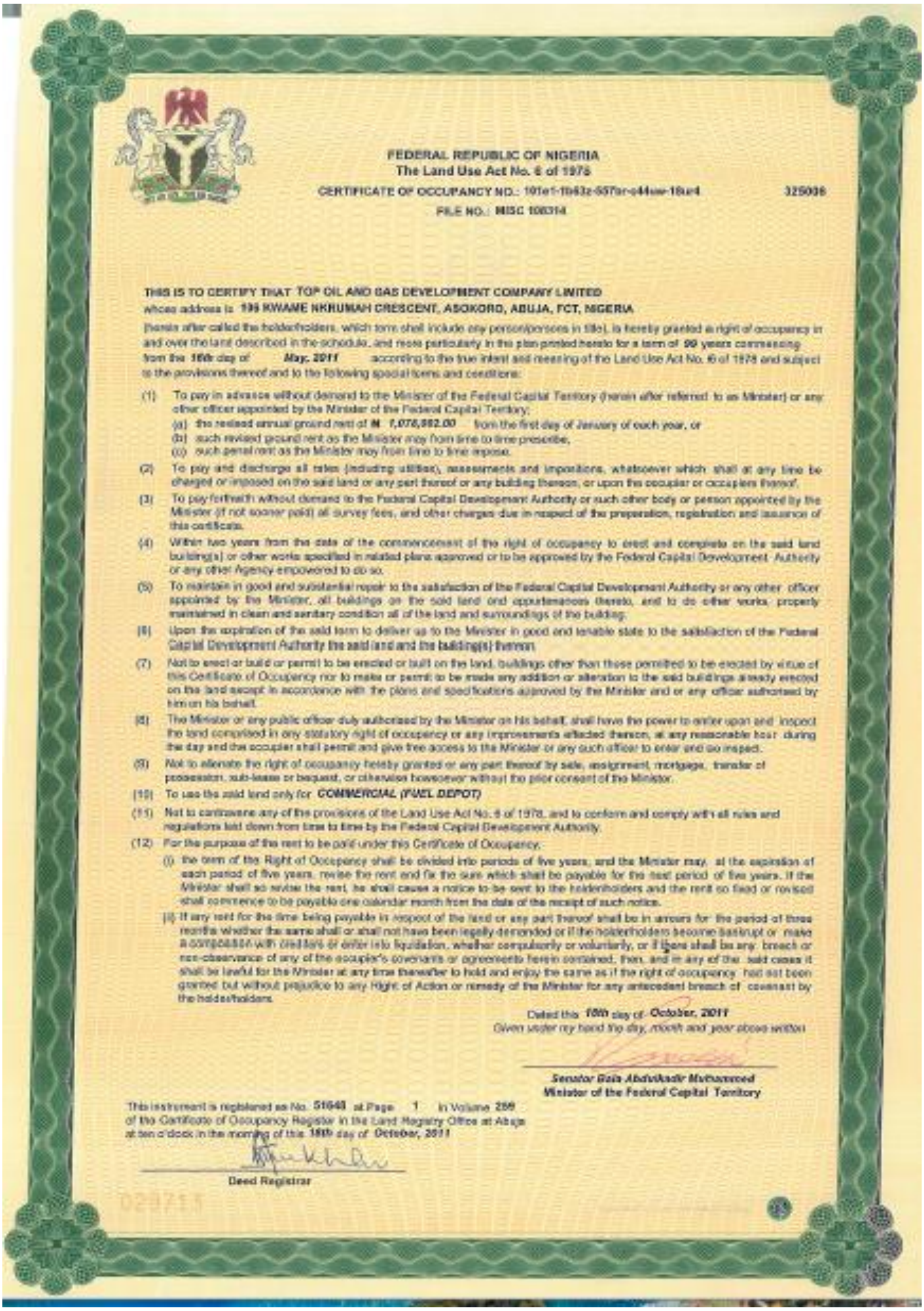
is this day incorporated under the COMPANIES AND ALLIED MATTERS ACT 1990 *and that the Company is Limited by Shares.*

Given under my hand at Abuja this Twenty-Ninth day of November, 2012

BELLO MAHMUD
Registrar - General

586961

Appendix 2: Proposed Project Site Land Title Documents



FEDERAL REPUBLIC OF NIGERIA
The Land Use Act No. 6 of 1978

CERTIFICATE OF OCCUPANCY NO.: 101e1-1b63z-557sr-c44uw-18ur4 325036

FILE NO.: MISC 108314

THIS IS TO CERTIFY THAT TOP OIL AND GAS DEVELOPMENT COMPANY LIMITED
whose address is 196 KWAME NKRUMAH CRESCENT, ASOKORO, ABUJA, FCT, NIGERIA

(herein after called the holder/holders, which term shall include any person/persons in title), is hereby granted a right of occupancy in and over the land described in the schedule, and more particularly in the plan printed hereto for a term of 99 years commencing from the 16th day of May, 2011 according to the true intent and meaning of the Land Use Act No. 6 of 1978 and subject to the provisions thereof and to the following special terms and conditions:

(1) To pay in advance without demand to the Minister of the Federal Capital Territory (herein after referred to as Minister) or any other officer appointed by the Minister of the Federal Capital Territory:
(a) the revised annual ground rent of ₦ 1,078,982.00 from the first day of January of each year, or
(b) such revised ground rent as the Minister may from time to time prescribe,
(c) such penal rent as the Minister may from time to time impose.

(2) To pay and discharge all rates (including utilities), assessments and impositions, whatsoever which shall at any time be charged or imposed on the said land or any part thereof or any building thereon, or upon the occupier or occupiers thereof.

(3) To pay forthwith without demand to the Federal Capital Development Authority or such other body or person appointed by the Minister (if not sooner paid) all survey fees, and other charges due in respect of the preparation, registration and issuance of this certificate.

(4) Within two years from the date of the commencement of the right of occupancy to erect and complete on the said land building(s) or other works specified in related plans approved or to be approved by the Federal Capital Development Authority or any other Agency empowered to do so.

(5) To maintain in good and substantial repair to the satisfaction of the Federal Capital Development Authority or any other officer appointed by the Minister, all buildings on the said land and appurtenances thereto, and to do other works properly maintained in clean and sanitary condition all of the land and surroundings of the building.

(6) Upon the expiration of the said term to deliver up to the Minister in good and tenable state to the satisfaction of the Federal Capital Development Authority the said land and the building(s) thereon.

(7) Not to erect or build or permit to be erected or built on the land, buildings other than those permitted to be erected by virtue of this Certificate of Occupancy nor to make or permit to be made any addition or alteration to the said buildings already erected on the land except in accordance with the plans and specifications approved by the Minister and or any officer authorised by him on his behalf.

(8) The Minister or any public officer duly authorised by the Minister on his behalf, shall have the power to enter upon and inspect the land comprised in any statutory right of occupancy or any improvements affected thereon, at any reasonable hour during the day and the occupier shall permit and give free access to the Minister or any such officer to enter and so inspect.

(9) Not to alienate the right of occupancy hereby granted or any part thereof by sale, assignment, mortgage, transfer of possession, sub-lease or bequest, or otherwise howsoever without the prior consent of the Minister.

(10) To use the said land only for *COMMERCIAL (FUEL DEPOT)*

(11) Not to contravene any of the provisions of the Land Use Act No. 6 of 1978, and to conform and comply with all rules and regulations laid down from time to time by the Federal Capital Development Authority.

(12) For the purpose of the rent to be paid under this Certificate of Occupancy.
(i) the term of the Right of Occupancy shall be divided into periods of five years, and the Minister may, at the expiration of each period of five years, revise the rent and fix the sum which shall be payable for the next period of five years. If the Minister shall so revise the rent, he shall cause a notice to be sent to the holder/holders and the rent so fixed or revised shall commence to be payable one calendar month from the date of the receipt of such notice.
(ii) If any rent for the time being payable in respect of the land or any part thereof shall be in arrears for the period of three months whether the same shall or shall not have been legally demanded or if the holder/holders become bankrupt or make a composition with creditors or enter into liquidation, whether compulsorily or voluntarily, or if there shall be any breach or non-observance of any of the occupier's covenants or agreements herein contained, then, and in any of the said cases it shall be lawful for the Minister at any time thereafter to hold and enjoy the same as if the right of occupancy had not been granted but without prejudice to any Right of Action or remedy of the Minister for any antecedent breach of covenant by the holder/holders.

Dated this 18th day of October, 2011
Given under my hand the day, month and year above written

Senator Bala Abdulkadir Muhammed
Minister of the Federal Capital Territory

This instrument is registered as No. 51648 at Page 1 in Volume 288 of the Certificate of Occupancy Register in the Land Registry Office at Abuja at ten o'clock in the morning of this 18th day of October, 2011

Deed Registrar

029711

LAND GRANTED TO TOP OIL AND GAS DEVELOPMENT COMPANY LIMITED
FILE NO: MISC 108314
DISTRICT: MPAPE
CADASTRAL ZONE: F04
PLOT NO: 186

DIRECTOR OF SURVEYING AND MAPPING

SCALE: 1:1500

SCHEDULE: AS DESCRIBED IN GRAPHICS ABOVE

NOTE:
FULL BEACON NUMBER FCT F04 PB 611
COORDINATES OF PB 611
N. 1,008,275.25
E. 330,023.76
COORDINATE SYSTEM UTM ZONE 32N

CADASTRAL MAP 1:2000

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329/1008/SE	330/1008/SW

SURVEYED BY: FCDA Land Surveyors Jan 2011

PREPARED BY: Abuja Geographic Information Systems 18th October 2011

POWER OF ATTORNEY

DONATED BY TOP OIL AND GAS DEVELOPMENT CO. LTD
(DONOR)

IN FAVOUR OF

JRB OIL & GAS LIMITED
(DONEE)

TO ACT ON HIS BEHALF IN RESPECT OF:

PLOT 186, CADASTRAL ZONE, FO3, ALONG KUBWA EXPRESS WAY, ABUJA, FCT.

PREPARED BY

BASHIR O IDRIS ESQ.
AL-AMIN ATTORNEYS.
6TH FLOOR, SUITE 2, NUSAIBA TOWERS
BEHIND BAFFI FURNITURES
KADO, ABUJA.
TEL: 08146492727

THIS IRREVOCABLE POWER OF ATTORNEY is made this _____ day of_____ 2024

BY

TOP OIL AND GAS DEVELOPMENT CO. LTD of Plot 186, Cadastral Zone, FO3, (Onex) Usman District, Kubwa Expressway, Kubwa, Abuja, FCT (hereinafter referred to as the **DONOR** which expressions shall where the context so permits include her Assigns, Heir, Executors, Administrators, Administratrix and Lawful Representatives) of the one part.

IN FAVOUR OF:

JRB OIL & GAS LIMITED of Plot 739, Cadastral Zone B, Muhammed M. Bello Way, Wuye District, Wuye, Abuja, FCT (hereinafter referred to as the **DONEE** which expression shall where the context so permits include her Assigns, Heirs, Executors, Administrators and Lawful Representatives) of the other part.

WHEREAS:

The Donor does hereby appoint the Donee as its true, lawful and authorized Attorney to do and execute all or any of the acts and things namely:

1. To take possession of the above-described Property and to manage and superintend the management of same, to develop the same for its sole use and benefit as owner in law.

2. To mortgage, charge, sell, lease, let and otherwise dispose of or deal with same in this regard and to execute any contracts, conveyances, assignments, transfers, leases, mortgages, charges, deeds and instruments whatsoever which the Donee considers necessary or proper.

3. To accept, surrender of leases and tenancies in respect of the property

and to enter into contracts, covenants and arrangements of all kind in relation to leasing the whole or any part thereof to tenants acceptable to the Donee as it may deem fit and proper, and to issue receipts for all payments in connection therewith.

4. To sign and give notices to tenants and occupiers of the property to quit or to repair or to abate a nuisance or to remedy a breach of covenant or for any other purpose whatsoever and to enforce all remedies open to the Donor in respect thereof and to enter upon any or all such parts of the property whether for the purpose of viewing the state thereof or in exercise of any rights of re-entry or other right of entry vested in the Donor.

5. To make and sign applications to the appropriate governmental departments or authorities, local authorities or other competent authorities for all and any licenses, permissions or consents required by law in connection with the management or improvement of the property, including the recovery of compensation where such is recoverable with power to give receipts and full discharge thereof and with full power to pay any development or other charges and to raise same by mortgage or charge upon the property in respect of which it is payable.

6. In the event of any order for compulsory acquisition, purchase or hiring by the Federal Government of Nigeria or any competent authority in the exercise of a statutory power or any notice to treat or to comply with any requirement being served in respect of the property above described, or any part thereof or any order being made affecting the same; to enter into negotiations with the authority issuing or making same and to take such steps as the Donee may deem fit to oppose or comply with such notice or order.

7. To keep off or prohibit and if necessary, proceed against by due process of law all trespassers to the property and to take appropriate steps whether by legal action or otherwise to abate all nuisances.

8. To accept in place of the Donor any compensation payable to it in respect of the exercise of any statutory power.

9. To take over and prosecute or continue to prosecute or defend all actions concerning the property.

10. The Donor shall maintain and defend the Donee against any claim of possessory rights of a third party.

11. The Donor hereby authorizes and empowers the Donee to acknowledge in its name and as his act and deed, this Power of Attorney and register and record same in the proper office of the Land Administration or the Land Registry, and to procure to be done, any other thing(s) whatsoever which may be requisite for authenticating and giving full effect to this Power of Attorney.

AND the Donor hereby ratifies and unequivocally confirms and unreservedly agrees to whatsoever the Donee shall lawfully do or purport to do by virtue of this Power of Attorney, which shall be construed as acts, deeds and things done by the Donor for all intents and purposes.

IN WITNESS WHEREOF the parties hereto have executed this Power of Attorney by affixing their **SEALS, SIGN and DELIVERED** in the manner below the day and year first above written.

SIGNED, SEALED AND DELIVERED BY THE WITHIN NAMED DONOR

Director

Secretary

SIGNED, SEALED AND DELIVERED BY THE WITHIN NAMED DONEE

Director

Secretary

Appendix 3: NMDPRA Site Suitability Approval Letter

NIGERIAN MIDSTREAM AND DOWNSTREAM PETROLEUM REGULATORY AUTHORITY

ABUJA ZONAL OFFICE

P.M.B. No: 609 Garki, Abuja
Telephone: 2970000, 4611777
Website: www.nmdpra.gov.ng

NMDPRA

Ref. No: NMDPRA/ROM/FC/LTE/25/158462
Date: Fri, Dec 12, 2025

THE MANAGING DIRECTOR,
JRB OIL & GAS,
NO 2 , IBM HARUNA STREET, UTAKO,
ABUJA,
ABUJA STATE.

RE: APPLICATION FOR LICENCE TO ESTABLISH INSPECTION FOR A PROPOSED JRB OIL AND GAS - PLOT NO. 186, CADASTRAL ZONE F04, MPAPE DISTRICT, ALONG KATAMPE - KUBWA EXPRESS WAY, FCT, Abuja Municipal L.G.A, Abuja State - APPROVED

Please refer to your application on the subject matter dated 15 October 2025 and be informed that the inspection conducted at your proposed site at the above location revealed that **THE SITE MEETS THE MINIMUM REQUIREMENTS** for the grant of **Licence to Establish (LTE)** a petrol station

You are advised to formally apply for **LTC**, within sixty (60) days from the date on this letter; providing the following documents in supportof your application:

1. CAC's Certificate of Incorporation
2. Current Tax Clearance Certificate (TCC)
3. Company's Memorandum & Articles of Association
4. Police report
5. Fire Report from relevant agency
6. Approved Building Plan (Size A4)
7. Letter from Land & Survey
8. Deed of Conveyance/Proof of Land Ownership
9. Environmental Impact Assessment (E.I.A.); If the propesed capacity of the facility is 180,000 liters and above (where Applicable)

Please ensure to erect a 1ft x 2ft x 6.6ft at the site, conspicuously displaying **"NMDPRA Approved Site for Petrol Station"** and note that FAILURE to submit your application within the stipulated time will render this clearance invalid.

Yours faithfully,

Maijiddah Abdulkadir
Regional Coordinator
Nigerian Midstream and DownStream Petroleum Regulatory Authority

Appendix 4: Accredited Lab. Certificate and Laboratory Analysis Results

FEDERAL MINISTRY OF ENVIRONMENT

ACCREDITATION TO OPERATE AS ENVIRONMENTAL CONSULTANT

Accreditation No: 0804285

The Permanent Secretary of the Federal Ministry of Environment (FMENV), hereby accredits the bearer whose particulars appear below to operate as Environmental Consultant pursuant to an Application for Registration/Renewal dated 12TH day of SEPTEMBER 20 11

1. Full Name of Consultant: ABUJA ENVIRONMENTAL PROTECTION BOARD
2. Location of Business Premises/Laboratory: BLOCK 10, PLANT NURSERY, ASOKORO, ABUJA, FCT
3. Year of Incorporation of Business:
4. Area(s) of Competence: ENVIRONMENTAL LABORATORY SERVICES

This Accreditation is granted subject to compliance with all regulations, Guidelines, Standards and Control criteria as may be issued by the Federal Ministry of Environment from time to time.

Date of Issue: 4TH JANUARY, 20 22 Expiry Date: 3RD JANUARY, 20 27

Seal of the Federal Ministry of Environment

Appendix 5: Attendance List

SOCIO ECONOMIC STUDY ATTENDANCE LIST
FOR EIA, EER, EA, PIA

Project JRB Oil & Gas LTD

Project Location Plot 186, Mpape District Cad. Zone A4, Abuja F

Name of Consultant GEOFTEDA VENTURES NIGERIA LIMITED

Date 05-02-2026

S.No	Name	Designation	Phone Number	Sign/Comment
1.	Yusuf Pada	Madaki	08033195248	Good device
2.	Isa Adamu	Secretary	07035038597	
3.	Umaru Rabo	Sarkin Yaki	08033694699	
4	Isa Dankolo	Sarkin Pada	08050430470	
5	Sa'adatu Abdullahi	—	08142367339	
6	Abubakar Mohammed	Youth		
7	Sani Aliyu	LGO	09080171063	
8	Sadiya Mohammed	Business		
9	Hadiza Auta	"		
10	Musa Josiah Ndabbeb			
11	Aliyu Adamu	Youth		
12	Abdullahi Ibrahim		08030930779	
13	Abdullahi Sanda	"	09078854570	