

**DRAFT**

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA)  
REPORT**

***OF THE***  
**PROPOSED AVIATION TURBINE KEROSENE (ATK)  
DEPOT**

***AT***  
**AVIATION VILLAGE, ABUJA MUNICIPAL COUNCIL  
(AMAC), FEDERAL CAPITAL TERRITORY (FCT), ABUJA**

***SUBMITTED TO:***  
**FEDERAL MINISTRY OF ENVIRONMENT,  
ABUJA**

***SUBMITTED BY:***  
**A. A. RANO NIGERIA LIMITED**



**NOVEMBER 2020**

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## LIST OF ABBREVIATIONS AND ACRONYMS

AEPB	Abuja Environmental Protection Board
AG	Associated Gas
AGO	Automotive Gas Oil
AMAC	Abuja Municipal Area Council (AMAC)
ANSI	American National Standard Institute
APHA	American Public Health Association
API	American Petroleum Institute
ATK	Aviation Turbine Kerosene
ASTM	American Society for Testing and Materials
BH	Borehole
BOD	Biological Oxygen Demand
BOM	Bill of Materials
BS	Bottom Sediment
Ca	Calcium
CAO	Computer Assisted Operation
CASHES	Community Affairs, Safety, Health, Environment & Security
dBA	Decibel Ambient
cm	Centimetre
CNIS	Canadian Institute of Standards
COD	Chemical Oxygen Demand
Cr	Chromium
Cu	Copper
DEP	Design and Engineering Practice
DO	Dissolved Oxygen
DPK	Dual Purpose Kerosene
DPR	Department of Petroleum Resources
DS	Dissolved Solid
E	East
EA	Exchangeable Acidity
EC	Electrical Conductivity
ECEC	Effective Cation Exchange Capacity
EIA	Environmental Impact Assessment
ELPS	Escravos-Lagos Pipeline System
EMP	Environmental Management Plan
EMS	Environmental Management System
EPC	Engineer, Procure, Construct and Commission
FAO	Food & Agricultural Organisation
FCT	Federal Capital Territory
FCTWB	Federal Capital Territory Water Board
FCT - EMIS	Federal Capital Territory – Education Management Information System
FEPA	Federal Environmental Protection Agency
FME <sub>env</sub>	Federal Ministry of Environment
Fig.	Figure
FIREPRAN	Fire Protection Analysis Study
F/S	Flow Stations
ft.	Feet
GIS	Geographic Information System
GPS	Global Positioning System
HAZID	Hazard Identification Study
HAZOP	Hazard and Operating Study
HC <sup>3-</sup>	Bicarbonate ion
HHWS	High High Water Surface
HP	High Pressure
HSE (SHE)	Health, Safety and Environment
KN <sub>3</sub>	Potassium Nitrate
H <sub>2</sub> S	Hydrogen Sulphide
LASEPA	Lagos State Environmental Protection Agency
LGA	Local Government Area
LNG	Liquefied or Liquid Natural Gas
LP	Low Pressure

LPG	Liquefied Petroleum Gas
MFD	Manufacturing for Design
MMC	Main Marketing Centre
MSDS	Materials Safety Data Sheet
M <sup>3</sup>	Metre Cube
M <sup>3</sup> /d	Meter cube per day
m/s	Meter per second
MAN	Manufacturers' Association of Nigeria
MAOP	Maximum Allowable Operating Pressure
mg/l	Milligram per litre
mm	Millimetre
MMscf/d	Million standard cubic feet per day
MPTS	Material Planning and Tracking System
N	North
Na	Sodium
NAG	Non-associated Gas
NIOMR	Nigerian Institute of Oceanography and Marine Research
NDT	Non-destructive Testing
NEPA(PHCN)	National Electric Power Authority (Power Holding Company of Nigeria)
NGC	Nigeria Gas Company
NH <sub>4</sub> <sup>+</sup>	Ammonium ion
NO <sub>3</sub> <sup>-</sup>	Nitrate
NTU	Nephelometric Turbidity Unit
OSFL	Ocean Shrimp Farms Limited
P	Phosphorus
Pb	Lead
PEFS	Process Engineering Flow Scheme
PFS	Process Flow Scheme
pH	Hydrogen Ion Concentration
PIAR	Preliminary (Environmental) Impact Assessment Report
PMS	Premium Motor Spirit
PO <sub>4</sub> <sup>-</sup>	Phosphate ion
PPM	Parts Per Million
PRMS	Pressure Reduction and Metering Station
PS	Pigging Station
QA/QC	Quality Assurance/Quality Control
ROW	Right of Way
SCADA	Security Control and Data Acquisition
SHOC	Safe Handling of Chemical
SLAR	Side Looking Airborne Radar
SPM	Suspended Particulate Matter
TSI	Technical Service Inspection
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
THC	Total Hydrocarbon Content
TM	Thematic Mapper
TSP	Total Suspended Particles
TSS	Total Suspended Solids
UNESCO	United Nations Educational Scientific & Cultural Organisation
VES	Vertical Electrical Sounding
VOC	Volatile Organic Compounds
µg/l	Microgram per litre
±	Plus or Minus
°C	Degree Celsius Degree
%	Percentage
WHO	World Health Organisation

## ACKNOWLEDGEMENT

**A. A. Rano Nigeria Limited** wishes to gratefully acknowledge the contributions of various people to the preparation of this EIA report. Particularly, we appreciate the support of the Federal Ministry of Environment (FMEnv), the Department of Petroleum Resources (DPR), Lagos State Ministry of Environment and Lagos State Environmental Protection Agency whose guiding counsels facilitated the completeness of this work / effort. We also appreciate the efforts of our EIA Consultants, Borky S. G. Bakre & Associates Ltd, who did a great job putting this report together.

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## EXECUTIVE SUMMARY

### ES.1 Introduction

1.1 **A. A. Rano Nigeria Limited**, that has its Head Office at Rano House, Opposite NNPC Depot, Hotoro, Kano, Kano State, is an indigenous Company registered in Nigeria under the Companies and Allied Matters Act 1990 (Re: RC 399320). The Company, established on 5<sup>th</sup> of January 2001, has been a major player in the downstream operations of the Nigerian petroleum industry. It has been engaging in those activities which involve storage, distribution, bulk-breaking; and largely concentrated on the retailing of Premium Motor Spirit (PMS or Petrol), Automotive Gas Oil (AGO or Diesel), Dual Purpose Kerosene (DPK or Kerosene) and Aviation Turbine Kerosene (ATK or Jet Fuel). These products have the highest demand for local consumption for energy.

The main activities of **A. A. Rano Nigeria Limited** in respect of the proposed Aviation Turbine Kerosene (ATK) Depot will be the receiving, storing, loading and distribution of the above-mentioned petroleum product - Aviation Turbine Kerosene (ATK) - Jet Oil.

The origin of the refined petroleum products will be from both local and imported sources

This EIA report on the proposed facility has been prepared in line with Local and International Guidelines and Standards, as well as in compliance with the Company's corporate policy on Safety, Health and Environment.

The regulatory framework under which this EIA was implemented includes those of the Department of Petroleum Resources (DPR), the Federal Ministry of Environment (FMEnv), and the local statutes that are in existence. In addition, applicable International Guidelines, Protocols convention were also taken in consideration.

### LEGAL AND ADMINISTRATIVE FRAMEWORK

The implementation of developmental activities in Nigeria is guided by several regulations. These regulations include both local and international conventions, and treaties, which relate to environmental conservation and protection. The relevant regulations have to be adequately considered in the process of preparing an EIA report or studies in preparing this EIA report, all the relevant regulatory requirements were adequately considered.



## ES.2 Project Justification

The project has been conceived in response to the existing lacuna in aviation fuel supply and distribution needed to sustain the Nigerian Aviation Industry, which is growing in outreach capacity. Thus, the planned **A. A. Rano Nigeria Limited's** Aviation Turbine Kerosene (ATK) Depot Facility is needed to:

1. Provide adequate and safe storage facility to ensure the availability of Aviation Fuel to operating aircrafts;
2. Provide an appropriate platform for the efficient distribution of Aviation Fuel from the storage facilities through retailers to operating aircrafts;
3. Contribute to the efficient supply of required energy needs towards the attainment of the vision 2020 goals;
4. Generate gainful employment opportunities, thereby contributing towards wealth creation;
5. Provide Government with revenue for the provision of social services through the payment of taxes;
6. Generate further earnings for investors/shareholders through profits, thereby creating further opportunities for investments and wealth creation.

### **Value of the Proposed Project**

Preliminary estimates show that the project value, in monetary terms, will be over One Billion Three Hundred Million Naira (₦1,300,000,000=), which will be financed through equity and loan.

### **Project Sustainability**

The sustainability of this project rests on the fact that the petroleum products for which the tanks are being built are in high demand and will remain so for at least thirty (30) years. The project proponents have a track record of several well-implemented projects' in the past. As facilities and structures associated with the project will be built to the highest possible Safety and Environmental Standards and will therefore be built to last for at least 25 years.

Scheduled Maintenance of the facilities is planned to take place annually; while Environmental, Social and Health considerations will be given adequate attention in the implementation of the project.

### **ES.2.1 Project Alternatives**

In line with Governments' Regulatory Requirements, an analysis of reasonable alternatives to various components of the proposed project must be carried out. The Alternatives Analysis identifies the reason for selecting a given policy, plan, or program rather than others that could involve different aspects.

The objective is to ensure that the most environmentally sound, cost-effective and practical means of achieving the desired project goals and objectives has been selected. This is done by using the information developed through the affected-environment-investigation (social considerations, etc.) and impact assessment in the analysis process.

The alternatives considered, which cut across construction technology, site selection and environmental regulatory issues include the, "Proposed Site / Location and Technology" and "Alternative Site" options.

**The analyzed project alternatives are briefly discussed below:**

### **Proposed Site / Location and Technology**

Using the proposed site and project layout technology, it is anticipated that this project will be better sited as proposed for the following reasons:

Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, is part of an area, within the vicinity of Abuja Airports, has been laid out and is being allotted to operators / businesses for the purposes of establishing Aviation related undertakings, including the establishment of Fuel Depots. In addition, the location is well positioned along both the International and Domestic Airports and has excellent road network for easy distribution of the product to aviation customers.

More so, Abuja, being the seat of the Federal Government and the location of some of the largest and busiest commercial airports in Nigeria and with developed facilities, is a great choice for citing the project, both in terms of location for receiving supplies and, having and handling sizeable patronage. Therefore, both in terms of economics and environmental considerations, the chosen project location is appropriate. Moreover, the proponents already have petroleum products' depots in other locations within Nigeria, including Kano and two (2) in Lagos state.

### **Alternative Site**

Considering alternative sites for the citing of the project, the following locations were looked on: i.) Lagos, ii.) Port Harcourt, and iii.) Kaduna, which also have airport facilities as does Abuja.

The proponent, already have petroleum products' depots in other locations within Nigeria, including Kano and two (2) in Lagos state, considered expanding its operations to other cities like Abuja, Port Harcourt or Kaduna, with viable airports. However, citing this particular project in Abuja, where an appropriately situated land has already been allocated by FCDA and paid for by the Company is readily available, comes with less hindrances; and of course, the market is readily available in Abuja, therefore, distribution will be quite cheap and within reasonable time.

## ES.2.2 Project Options

The project Options were selected based on the following criteria:

### No Project Option

By the No Project option, the construction of the tank farm will not proceed. The proposed project site will either be abandoned or alternative use found for it. If abandoned, there may be no change in the physico-chemical parameters at the site and surrounding environment, but there may likely be change in the biophysical characteristics of the site and consequently, social characteristics of the site and surrounding environment. But if used for other purposes, the possible changes will be determined based on the nature of the particular project. In whichever way, while the “No Project” option will eliminate associated and potential negative impacts within the area of influence of the project, this option will go against the Federal Government initiative to increase the availability and supply of petroleum products to the country. The lightening facility that shall be provided by this facility to other tank farms will be lost, so also is the potential revenue that will accrue to government.

### Do Project, or Implement Project, Option

By the “Go Ahead, or Implement Project,” option, the project would be implemented in its present designed form. With this option, all the identified associated and potential impacts are likely to happen, but with the planned mitigation measures planned along with the project, such impacts will be properly brought under control.

### Delayed Project Option

By the “Delayed Project” option, the project would be postponed to a later date. Similar to the “No Project” option, associated and potential negative impacts within the area of influence of the project would be avoided; however, this will be temporary. It would have the advantage of allowing for further project planning and time to implement mitigation measures with longer lead times.

A “Delayed Project” option shall cause:

- a. Unanticipated increase in the cost of the project due to inflation;
- b. Demobilization of all processes already put in place for the project, without any justified benefit.
- c. All these, and other related problems make it unattractive to adopt the “Delayed Project” option.

Following the careful review of three options highlighted above, the second option, (“2.5.2 – **Do Project, or Implement Project, Option**”), was adopted.

### ES.3 Project Location:

The Proposed Aviation Turbine Kerosene (ATK) Depot is to be located on a parcel of land with the following geo-coordinates: **8°59'9.208"N to 8°59'19.846"N and 7°16'9.629"E to 7°16'22.542"E**), within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria.

See Figures 1.1 to 1.5 and Plates 1.1 to 1.8, for details.

The site of the proposed facility is bounded by the following:

- 1.) On the Northern Axis by Nnamdi Azikiwe International Airport Road;
- 2.) On the Southern Axis by a vacant plot belonging to A. A. Rano Nigeria Limited;
- 3.) On the Eastern Axis by a vacant plot;
- 4.) On the Western Axis by A. A. Rano Nigeria Limited Filling Station;

The satellite photo of the proposed project location, the survey map of the general area, and the general layout of the proposed A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) along Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria. The Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria. See Figures 3.1 to 3.4 below.

The proposed Aviation Turbine Kerosene (ATK) site occupies a total land area of 1.2377 Hectares.

#### **Associated Facilities**

The various components of the project are presented below to allow for better appreciation of the proposed project.

The project scope of work can be summarized as follows:

1. Soil conditioning and stabilization;
2. Geotechnical survey of site and confirmation of suitability / requirements for suitability for this project;
3. Raft foundations for tank bases, bund walls and pump bases;
4. Construction of tank bases, pump foundation, bund wall, and loading bay floors;
5. Construction of 6 – ATK Tanks of 3,230,200 Litres total effective capacity;
6. Loading Island with capacity for loading four (4) refueller trucks at a time

Figures 3.5 and 3.10, for details.

7. Trucks Parking Lot:

A Trucks Withholding Bay with capacity for 20 Trucks within the proposed depot site, is planned along with the proposed project;
8. One (1) Slop Tank with capacity of 30,000 Litres:

Slop tanks are used to separate and recover leaked or spilled oil products from wastewater or storm water gathered from within bund walls, etc.
9. Three (3) Monitoring Wells:

These wells are required to monitor the quality of ground water and to observe incase of any seepages or oil pollution arising from the operation of the depot.
10. Bund Walls (with capacity for 120% of the storage capacity of bunded tank):

The bund walls are to collect any spillage during operations or rupture of refined petroleum products' storage tanks. Besides the above, it gathers storm water around the petroleum products tanks, which is then channeled to the slop tanks for separation using the gravity - floatation process.
11. An Admin Building, consisting of:
  - i.) Offices;
  - ii.) Toilets;
  - iii.) Conference Room;
  - iv.) Maintenance Office;
  - v.) Laboratory, etc.
12. A Utility Building, consisting of:
  - i.) Utilities Section;
  - ii.) Switchgear Room;
  - iii.) Control Panels.
13. Pump House – comprising 4 Nos. Pumps:
  - i.) 3 - Nos. Product Pumps - loading and unloading;
  - ii.) 1 - No. Flush Pump;
14. Other Associated Facilities

See Figure 3.5 for layout.

Other associated facilities that will be provided for the smooth and sustainable operation of the tank farm are:-

  - i.) Car park;

- ii.) Security House;
- iii.) Foam Bladder Tank;
- iv.) Generators House;
- v.) Water Treatment Plant;
- vi.) Oil - Water Separator;
- vii.) National Grid Installation - 11,000V medium tension;
- viii.) 650 KVA Transformer;
- ix.) 2 Nos. Electricity Generating Machines;
  - a.) 1 No. 500 KVA;
  - b.) 1 No. 100 KVA.
- x.) Fresh Water Storage Tank (1,275,000 litres);  
An industrial borehole shall be sunk and the water from it will be used for firefighting, cooling of tanks and for other uses;
- xi.) Soakaway Tank
- xii.) Septic Tank

### Estimated Labour Requirements:

1. Civil Works	10-17 persons
2. Structural Steel Works and Piping	5 persons
3. Tank Fabrication and Erection	7 persons
4. Electrical	3 persons
5. Equipment Installation	4 persons
6. Fire Fighting Equipment Installation	3 persons
7. Aluminium Windows, Doors, Partitions and Roofs	3 persons
8. Auxiliary Works	3 persons

Total Manpower Requirement will range from 38 to 45 persons to be distributed as follows:  
30% Skilled; 30% Semi-skilled; and 40% Unskilled.

### Possible Hazards

**A list of possible hazards to staff, equipment, processes, systems and the environment was generated which include:**

1. Hydraulic (water) Hammer;
2. Explosive/Flammable Mixtures;
3. Fire (internal/external);

4. Pollution;
5. Excess Noise;
6. Erosion/Corrosion;
7. Vibration (Stress);
8. Sudden Stoppage;
9. Start - up/Shutdown;
10. Static accumulation/lightning;
11. Failure Mode Valves;
12. Isolation/Purging;
13. Cleaning/Loading/Unloading.

**Pollution to the environment is expected to be likely as a result of the following sub-systems of activities on the tank farm:**

1. Loading of Petroleum Products;
2. Offloading of Petroleum Products;
3. Tanks;
4. Pumping liquids back to vessel;
5. Drainage Systems and Vapour System;
6. Fire Water Tank, Water and Foam System

Extreme fire hazards exist in the event of a tank rupture or within tanks as a result of ignition from lightning, static charges or increased temperature within tanks. The vapours of combustibles liquids are also highly flammable and can be easily ignited.

Health hazards also exist if operators inhale vapours or are otherwise exposed to carcinogenic carbon-based compounds. All staff during operational phase, will be educated on potential hazards, and be encouraged to adorn protective clothing always.

**A detailed contingency plan for product spill response has been developed for this project.**

**The basic features include:**

1. Prevention;
2. Minimization;
3. Prompt Response and Containment;
4. Recovery;
5. Remediation of affected sites;
6. Compensation of affected parties.

## **PROJECT IMPLEMENTATION SCHEDULE**

The various pre-project activities are planned to span a period about twenty-one (21) calendar months, altogether.



## ES.4 Description of the Environment

### Sampling Methodology

As the location of the proposed A. A. Rano Nigeria Limited's ATK Depot is within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, a place specifically layed out for projects of this type, by the Federal Aviation Administration of Nigeria (FAAN), with the EIA of the general area haven been conducted and EIA / EMP for other projects conducted within Aviation Village, within the past two (2) years, we have leveraged on the data contained in the EMP (2019) of Everlink Telesat Network Limited, which has its Four Star Hotel project, also along Nnamdi Azikiwe International Airport, Aviation Village, just as A. A. Rano Nigeria Limited's ATK Depot, though a different project; about 1.85km away and sharing same geographical and ecological characteristics (where twenty-two (22) samples were collected).

In addition to the above-stated, a single season data gathering (field works) exercise was conducted in October 2020, during which twenty-six (26) samples were collected.

### Climate and Meteorology

The entire project area, within Abuja Municipal Area Council (Coordinates: 8.90433 7.32930 9.22433 7.64930 – Minimum Elevation: 292 m - Maximum Elevation: 933 m - Average Elevation: 499 m), in Abuja, Federal Capital Territory (FCT), falls under the tropical wet and dry climate. The FCT experiences the following three weather conditions annually:

- 1.) warm, humid rainy season;
- 2.) blistering dry season; and
- 3.) a brief harmattan season as interlude between the first two.

The major climatic elements of the area include: rainfall; temperature, wind (speed and direction); relative humidity and sunshine. Similarly, the major climatic factors include: latitudinal location; elevation; prevailing winds over the season, apparent movement of the sun across the tropics; and relative stability of the Inter Tropical Convergence Zone (ITCZ).

Features of interest in the area are:

- a. Temperature;
- b. Rainfall;
- c. Relative Humidity;
- d. Wind Direction and Speed;
- e. Sunshine Hours.

The temperature of the project area ranges from a minimum (monthly temperature) of 16.9°C in December to maximum (monthly temperature) of 35.1°C in March.

The average monthly temperature ranges from 23.9°C (August) to 28.5°C (April).

The lowest average monthly rainfall was recorded in the month of December (1 mm) while the highest was recorded in the month of August (238 mm).

Relative humidity of the study area ranges, from 38% (February) to 88% (August) with a mean of 65.9%.

Wind speed was generally low usually, less than 10 knots (5.14 m/s) for most periods of the year. The highest wind speed of 9.3 knots (4.78 m/s) occurred in April, while the lowest wind speed of 6.6 knots (3.39 m/s) occurred in November.

In the study area, the sunshine hours vary, from a minimum of 5hrs in both July and August to 9hrs in both November and December; and the average sunshine hours, is 7.083hrs.

The daylight hours vary, from a minimum of 11.6hrs in December to 12.6hrs in both June and July; and the average daylight hours, is 12.12hrs.

### **Geology and Hydrogeology**

The geology and hydrogeology of the study area has been described by many workers, including Ajibade (1976), Grant (1978), McCurry (1985) and Ajibade and Woakes (1983). The study area is underlain by Precambrian rocks of the Nigerian Basement Complex which cover about 85 % of the land surface and cretaceous sedimentary rocks belonging to the Bida Basin which cover the remaining 15 %. From a geological mapping carried out (M. A. Dan-Hassan (2012), P. I. Olasehinde (2012) and J. Yisa (2012)), the major lithologic units found are: migmatite-gneiss; older granites; Meta-sediments (mainly schist, phyllite and quartzite) and Bida sandstones.

### **Air Quality and Noise Levels**

From the results obtained, it can be seen that Mean Levels of the following parameters tested for: CH<sub>4</sub>, SO<sub>2</sub>, NO<sub>2</sub>, NO<sub>x</sub>, and HC did fall within Nigerian Ambient Air Quality Standards.

Noise level in the study area was within the conformance limit of 90dB.

### **Ground Water**

The results revealed that the pH of the water, though within set limit, was ranging between mild acidity and neutrality with values range of 6.8 to 7.4, for both sites, but with Phosphate being high

in the 2019 sample while both Phosphate and Nitrate are high in only one of the two samples for 2020.

The heavy metal analyses of the water samples showed that the levels of metals in the water were generally low and, in most cases, not detectable, except for Magnesium, which was relatively high in both the samples for 2019 and 2020.

With respect to the microbiological parameters of the water samples, the Total Plate Count was found to higher than government set limit, while the presence of coliform, Salmonella and Ent. Aerogenes, was confirmed in some of the samples for both 2019 and 2020 data gathering exercises.

### Surface Water

The results of the parameters tested for, indicate that the pH of the stream water body is within neutrality, with a value of 7.2.

Both the Phosphate and Nitrate are higher than the respectively set government limits.

The heavy metal analyses of the water samples showed that the levels of metals in the water were generally low and, in some cases, not detectable, except for Magnesium, which was higher than set limit.

With respect to the microbiological parameters of the water samples, the Total Plate Count was found to higher than government set limit, while the presence of coliform, Salmonella and Ent. Aerogenes, was confirmed in the analysed water sample.

### Soils

The soil formation in the study area, is mainly lateritic soil with intermix of cohesive and granular material encountered on the site within the test area and depth investigated. The material encountered also generally includes decompose (weathered quartzite) / sandy intercalation with some mica and rock fragments.

The subsoil condition on the site is fairly uniform. There are, however, some variations in soil consistency and layer thickness / boundaries at the different tests points.

Soil pH ranged from acidity to alkalinity (6.4 to 6.8 from Table 4.17 (6 samples) and 6.2 to 8.4 from Table 4.18 (7 samples)).

Percent Organic Content figures were found to be low for soil samples for both sites, but the Heavy Metals Contents in the samples were found in low concentrations in the soils of the study areas except for Fe and Zn in the samples collected from the proposed ATK depot site.

## Microbiology (Soil)

The results of soil microbiology of the proposed project area as shown in the Tables 4.18 indicate a very high count recorded for all the sampling stations for heterotrophic and the hydrocarbon utilizing bacteria. This is an indication of some degree of pollution of the soil.

## Vegetation

Most of the vegetation of the proposed project area of study at Aviation Village, Abuja Municipal Area Council (AMAC), Abuja FCT, and adjoining community, which used to be dominated by the savanna vegetation species, has now been seriously wiped out; with present vegetation cover being majorly of secondary or even later growth.

## Socio - Economic

Abuja Municipal Area Council (AMAC), where the site of the proposed ATK depot project is being located, had no recorded population as per 1991 census figure, but according to 2006 census result, it had a population of about 776,298 persons, thereby making it the most populous local government area in the FCT, accounting for 55.2% of total. With a total land mass of about 1,476 square kilometres (km<sup>2</sup>) it is the second (2<sup>nd</sup>) largest local government area of the six (6) local government areas of the Federal Capital Territory. However, despite being second on land mass, it has the highest population densities of the local government areas in the FCT, having a population density of 526.0 people per square kilometre (km<sup>2</sup>) according to 2006 census (see Table 4.20). And based on 2016 estimates, the population of AMAC increased to 1,967,500 people with a population density of 1,333 people per square kilometre (km<sup>2</sup>), still maintaining its lead in both population and population density.

Unlike what obtains in the communities in modern urban settlements, the literacy rate of the people directly bordering the site of the proposed ATK depot project is low; this can be attributed to the absence of educational institutions - both primary and secondary schools – within the immediate environment, with the closest being between two and half, and four and half kilometres away. The inadequate intervention of governments (federal, territorial and local) to education has adversely affected the provision of good educational facilities for the communities

The Federal Capital Territory (Abuja) is both the political and administrative capital of Nigeria – the location of the Three Arm – The Executive Headquarters (Aso Rock Villa), the National Assembly Complex and the Supreme Court. So, it plays host to several embassies, high commissions, international / multilateral bodies, including Economic Community of West African States

(ECOWAS) among others. Hence, Abuja is a multi-ethnic cosmopolitan city serviced by good transportation network, hotels and other facilities to support its flourishing administrative, business, commercial and light industrial activities.

Despite the above, the indigenes of the neighbouring communities can be said to live in the neglected rural slums within the bubbling urban territory, with they being mainly artisanal farmers / farmland workers, artisans, transporters (motor bikes and tricycles) and petty traders.

The epileptic management of social facilities in recent times has led to the collapse of some of the available social infrastructures.

**During the several interactions (both formal and informal) with stakeholders with respect to the proposed Tank Farm project, the following concerns were expressed:**

1. The possibility of the neighbouring communities receiving support in the form of establishment / provision of the following amenities:
  - Medium Tension Electrical Transformers;
  - Primary and Secondary Schools;
  - Healthcare Centre;
  - Potable water supply source;
  - Grading of the access roads to the communities;
  
2. Possibility of employment opportunity;

**The above stated concerns were however addressed during the consultations:**

1. They were guaranteed that the best industry practice will be employed during the construction and operation of the facility, to ensure that damage to the environment and people will be totally avoided.
  
2. With respect to the possibility of the neighbouring communities receiving support in the form of establishment / provision of some social amenities lacking in the communities, they were assured that the company shall work with their representatives to envision and sponsor projects that will carry the highest interest of the majority of community members at any given time. Such sponsored projects shall be developed to be self sustaining and shall be completely owned by the communities upon being delivered / commissioned.
  
3. As regards the issue of employment, it will be part of the proponent's employment policy to allocate a specific percentage of its intended manpower to the indigenes of the community, provided they fulfill the requirements.

**ES.5 Associated and Potential Impacts**

Impacts shall occur during the following activities:

1. Site Preparation;
2. Excavation;
3. Foundation (Tanks, Building and Roads);
4. Concrete Construction;
5. Steel Construction;
6. Finishing;

**ES.6 Mitigation Measures**

Mitigation measures for the negative impacts identified will include those that have been built into the project design and others:

1. Collaborating with other investors/stakeholders in the area and government to effectively solve the area's flood problem;
2. Timing of project activities to avoid peak traffic periods;
4. Provision of high - efficiency burners in vehicles and other combustion units to minimize air quality impacts;
5. Provision of adequate trucks parking facilities to prevent blockage of access roads;
6. Enforcing speed limits on the waterways;
7. Provision of appropriate/adequate safety measures, incorporating: - prevention, detection, control and management systems;
8. Provision of pollution abatement facilities;
9. Collaborating and formulating Memorandum of Understanding (MOU) with the host community to address community-level needs, as a means of providing Corporate Social Responsibility (CSR).

## **ES.7 Environmental Management Plan (EMP)**

**A. A. Rano Nigeria Limited** will develop a plan to manage and monitor the environmental, socio-economic, health and safety impacts of the tank farm project construction and operation in accordance with Nigerian and applicable International Standards and Regulations. In this regard, a two-pronged environmental management framework shall be adopted. The framework consists of an Environmental Management System (EMS) and an Environmental Management Plan (EMP).

**The basic components of the EMS, which shall be developed for this project include:**

1. Commitment by leadership at all levels to foster operational excellence by assuring alignment of vision, expectations, resources and accountability;
2. Comprehensive identification of high-level issues, risks, opportunities, and gaps in system and operating practices that can impact current or future ability to achieve the required level of performance;
3. Establish process to ensure that documents and records that are critical to operational excellence are current, controlled, and accessible;
4. Implement a process to ensure that contractors (“agents”) authorized to act on behalf of the company understand and comply with relevant company policies and procedures;
5. Establish and maintain appropriate processes for management to regularly monitor company’s SHE performance, conduct regular HSE audits and evaluations to ensure that the system is implemented and maintained and remains effective.

**The Environmental Management Plan (EMP) covers two (2) types of monitoring activities:**

1. Monitoring of compliance with mitigation measures during construction activities and;
2. Environmental effect monitoring, which includes sampling and analyses of discharges and the recipient environment.

The monitoring programme establishes the specifics of the environmental and socio-economic monitoring parameters for each component of the environment that will be affected by the proposed project.

**The components are:**

1. Air Quality;
2. Noise;
3. Ground Water Quality;
4. Vegetation and Wildlife;
5. Soil;
6. Waste Management;
7. Traffic and Transport;
8. Personnel Health and Safety;
9. Socio - Economic Impact.



## **ES. 8 Decommissioning and Abandonment Plan**

The following measures shall be planned for implementation pending decommissioning and abandonment:

1. The tanks shall be dismantled and sold as scraps;
2. Bund walls around the tank bases shall be demolished and the opened-up area re-vegetated; the broken blocks shall be sold for use as hardcore while the reinforcement bars shall be sold to second-hand rod/scrap dealers;
3. Contaminated soils, where they occur, shall be restored using various options such as thermal, chemical and / or biological remediation;
4. All pits and excavations shall be reclaimed and re-vegetated;
5. Buildings used for administrative purposes shall be leased out or used for other productive ventures;
6. Appropriate pension schemes shall be put in place for project workers so that they can have something to fall back on if and when the project is decommissioned and abandoned.

## ES. 9 CONCLUSIONS

Based on the foregoing, the proposed project has more positive impact than negative ones and will hence contribute positively to the well-being of the host community and society, at large.

This will be mainly through:

1. Regular supply of fuel for energy;
2. Employment generation; and
3. Community upliftment.

The project will also add to the income of A. A. Rano Nigeria Limited, thereby increasing its profit and hence, possible tax revenue to government for provision of social amenities.

In addition, customers will be adequately supplied their products in time with little or no problem.

Despite these facts, the project also has its potential negative impacts on the environment; and those impacts have been highlighted, and so also have the mitigation measures to avoid/reduce such negative impacts.

In conclusion, A. A. Rano Nigeria Limited will be conscious of community development as a strategy, it pays and the people that benefit from such gesture will never forget.

Based on the above submissions, we are praying the Department (DPR) to, please, grant us EIA Permit on our proposed Aviation Turbine Kerosene (ATK) Depot at Aviation Village, Nnamdi Azikiwe International Airport Road (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Federal Capital Territory, Abuja, Nigeria, using this EIA on the project as basis of assessment.

## CHAPTER ONE

### 1.0 BACKGROUND INFORMATION

1.1 **A. A. Rano Nigeria Limited**, that has its Head Office at Rano House, Opposite NNPC Depot, Hotoro, Kano, Kano State, is an indigenous Company registered in Nigeria under the Companies and Allied Matters Act 1990 (Re: RC 399320). The Company, established on 5<sup>th</sup> of January 2001, has been a major player in the downstream operations of the Nigerian petroleum industry. It has been engaging in those activities which involve storage, distribution, bulk-breaking; and largely concentrated on the retailing of Premium Motor Spirit (PMS or Petrol), Automotive Gas Oil (AGO or Diesel), Dual Purpose Kerosene (DPK or Kerosene) and Aviation Turbine Kerosene (ATK or Jet Fuel). These products have the highest demand for local consumption for energy.

1.2 The main activities of **A. A. Rano Nigeria Limited** in respect of the proposed Aviation Turbine Kerosene (ATK) Depot will be the receiving, storing, loading and distribution of the above-mentioned petroleum product - Aviation Turbine Kerosene (ATK) - Jet Oil.

1.3 The origin of the refined petroleum products will be from both local and imported sources.

### 1.4 THE PROJECT

1.4.1 The proposed project involves the construction of an Aviation Turbine Kerosene (ATK) Depot, which will have Six (6) Storage Tanks with Total Capacity of 3,230,200 Litres, distributed as follows:

- 1.) 1 – Vertical ATK Tank of 2,000 Cubic Metres effective capacity;
- 2.) 2 – Vertical ATK Tanks of 502 Cubic Metres effective capacity each, thereby making a total of 1004 Cubic Metres effective capacity;
- 3.) 3 – Horizontal ATK Tanks of 75.4 Cubic Metres Effective capacity each, thereby making a total of 226.2 Cubic Metres Effective capacity.

### 1.5 LOCATION OF THE PROPOSED AVIATION TURBINE KEROSENE (ATK) DEPOT

1.5.1 The Proposed Aviation Turbine Kerosene (ATK) Depot is to be located on a parcel of land with the following geo-coordinates: **8°59'9.208"N to 8°59'19.846"N and 7°16'9.629"E to 7°16'22.542"E**, within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria.

See Figures 1.1 to 1.5 and Plates 1.1 to 1.8, for details.

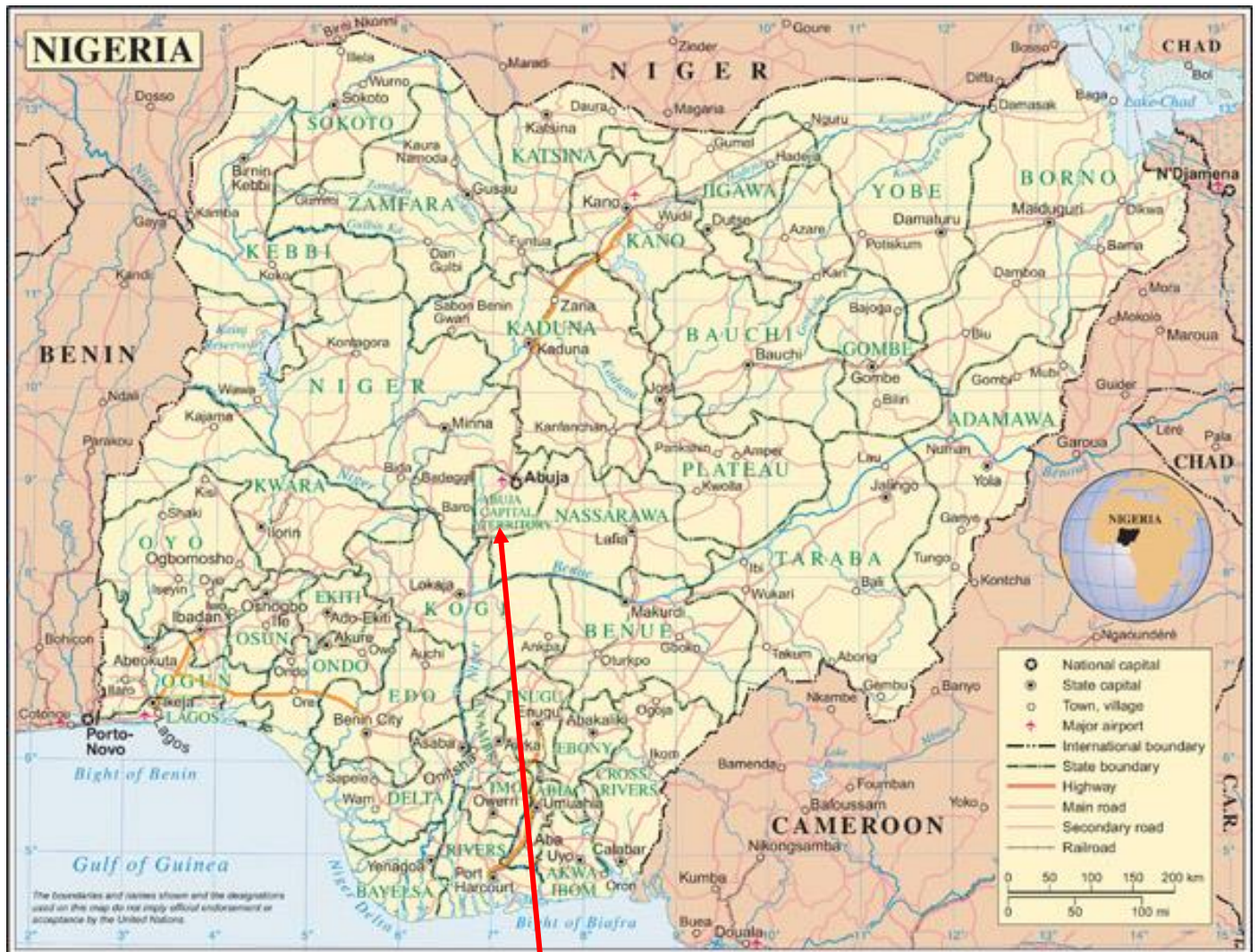
The site of the proposed facility is bounded by the following:

- 1.) On the Northern Axis by Nnamdi Azikiwe International Airport Road;
- 2.) On the Southern Axis by a vacant plot belonging to A. A. Rano Nigeria Limited;
- 3.) On the Eastern Axis by a vacant plot;
- 4.) On the Western Axis by A. A. Rano Nigeria Limited Filling Station.

A general layout of the proposed A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) at Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, is shown in Figures 1.3 and 1.5.

1.5.2 The proposed Aviation Turbine Kerosene (ATK) site occupies a total land area of 1.2377 Hectares.

Politically, Nigeria is divided into 36 states and the Federal Capital Territory, Abuja . The divisions are as follows:



Source: <http://www.vidiani.com>

Figure 1.1: Political Map of Nigeria Showing Abuja, FCT



**SOME PHOTOS OF LOCATIONS AND FACILITIES ON AND AROUND THE PROPOSED PROJECT SITE**



**Plate 1.1: Proposed Project Site from the North-Western Axis**



**Plate 1.2: Proposed Project Site from the North-Western Axis**



**Plate 1.3: Proposed Project Site from the Northern Axis**



**Plate 1.4: Proposed Project Site from the South-Eastern Axis**



Plate 1.5: Proposed Project Site from the North-Eastern Axis



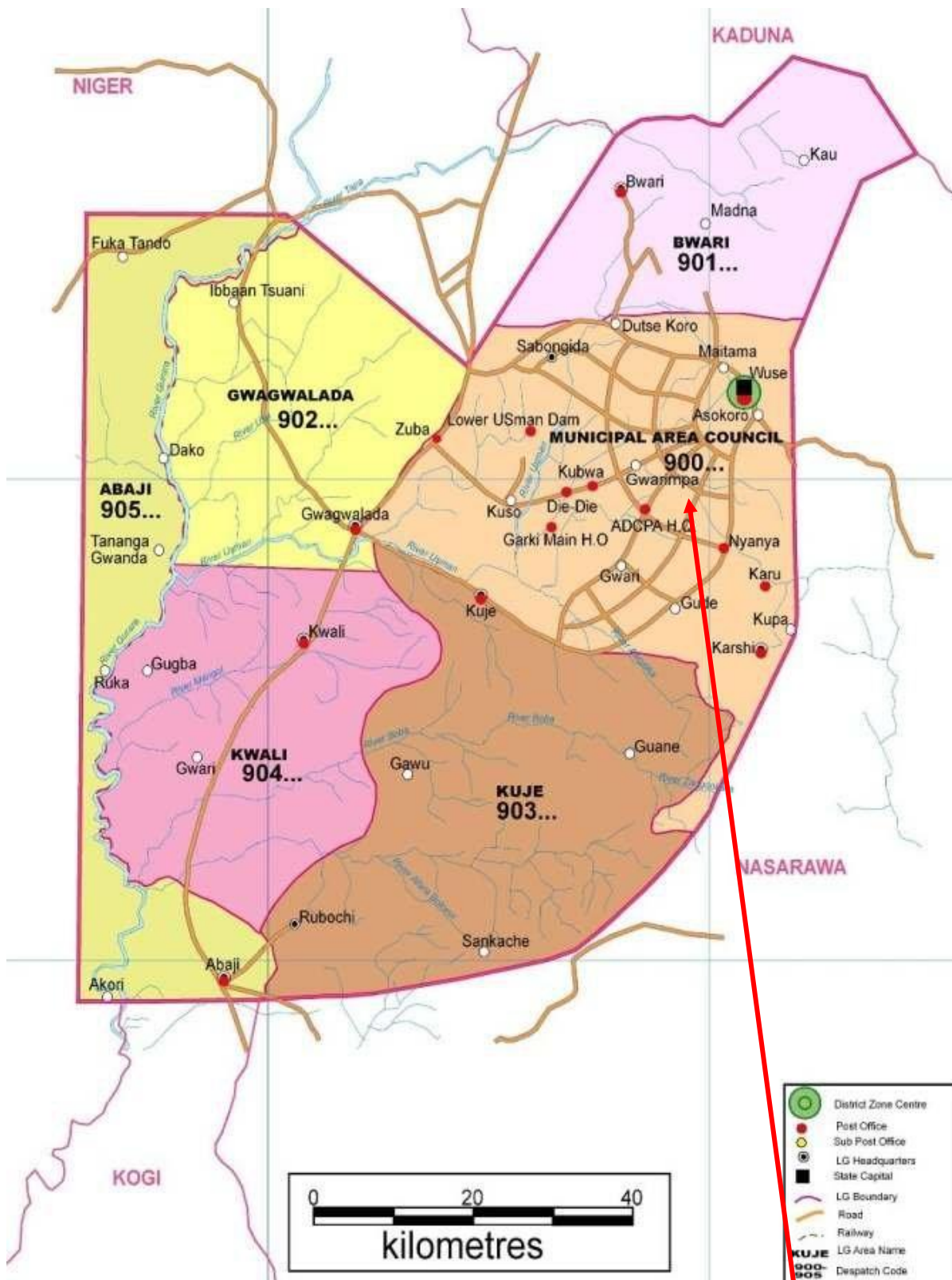
Plate 1.6: Proposed Project Site from the North-Western Axis



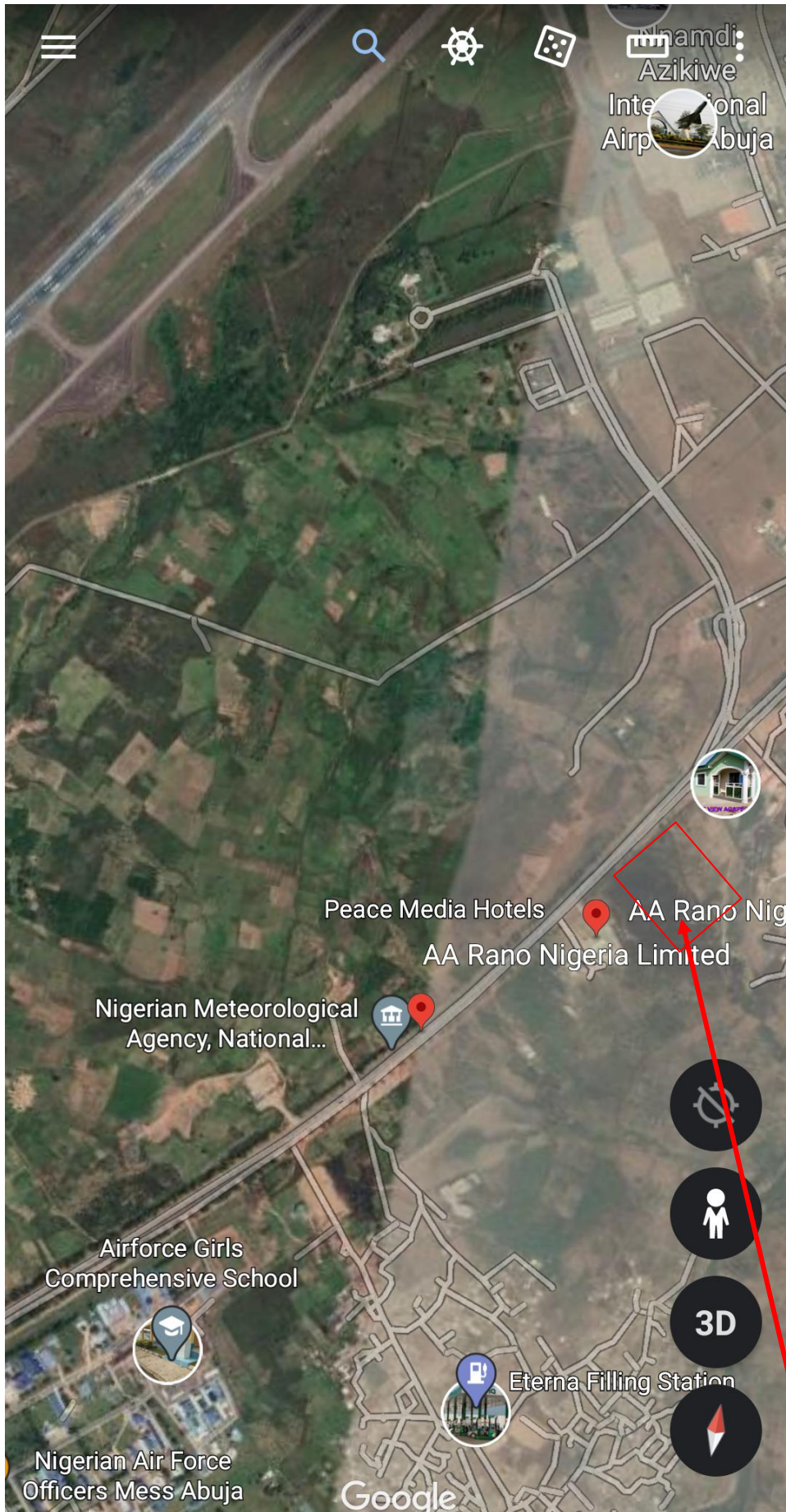
Plate 1.7: Southern Axis of the Proposed Project Site



Plate 1.8: Proposed Project Site from the Eastern Axis

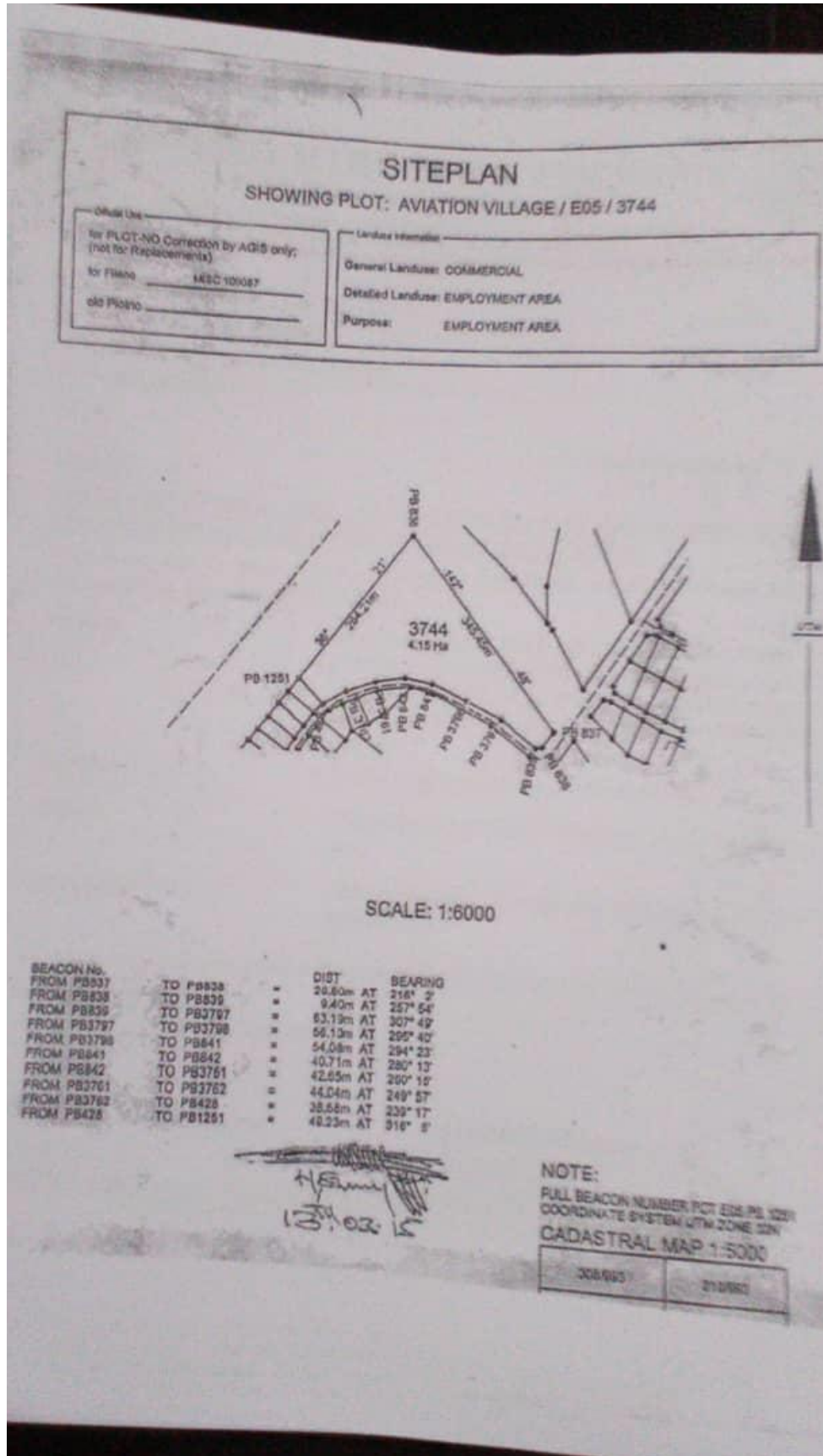


**Figure 1.2: Administrative Map of Abuja FCT showing the Abuja Municipal Area Council (AMAC)**

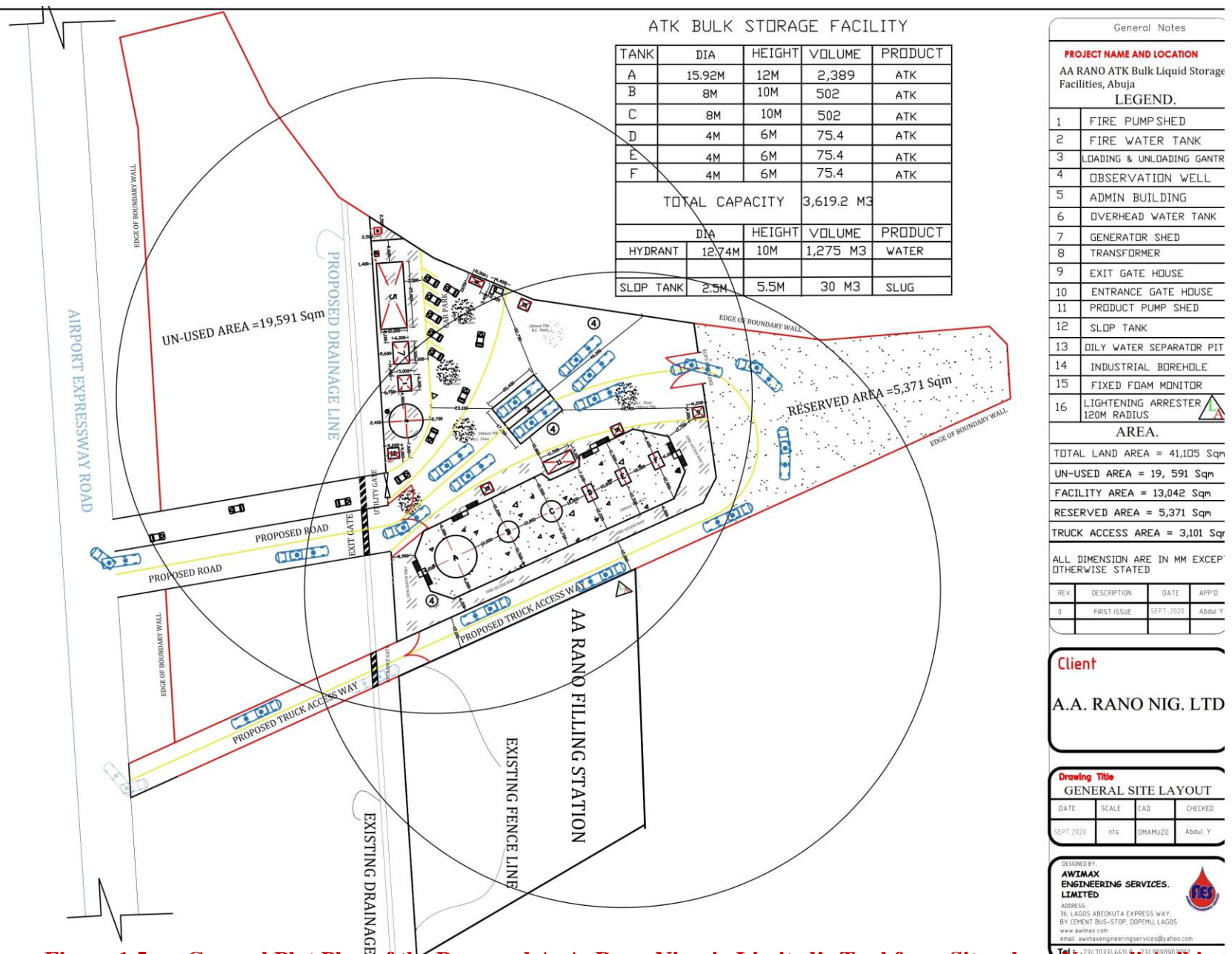


**Figure 1.3: Satellite Map of Aviation Village Area of Abuja Municipal Area Council Showing the Approximate Location of the Proposed A. A. Rano Nigeria Limited's ATK Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**





**Figure 1.4: Survey Map of the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



**Figure 1.5: General Plot Plan of the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

## 1.6 THE PROPONENT

The proponents of this project are Messrs: **A. A. Rano Nigeria Limited**, the Company was incorporated in Nigeria under the Companies and Allied Matters Act 1990 (Re: RC 399320). The Company, incorporated on the 5<sup>th</sup> of January 2001, is an oil marketing company.

A. A. Rano Nigeria Limited has its Head Office at Rano House, Opposite NNPC Depot, Hotoro, Kano, Kano State. The Company has been a major player in the downstream operations of the Nigerian petroleum industry.

It has been engaging in those activities which involve storage, distribution, bulk-breaking; and largely concentrated on the retailing of Premium Motor Spirit (PMS or Petrol), Automotive Gas Oil (AGO or Diesel), Dual Purpose Kerosene (DPK or Kerosene) and Aviation Turbine Kerosene (ATK or Jet Fuel). These products have the highest demand for local consumption for energy.

A. A. Rano Nigeria Limited is proposing to build an Aviation Turbine Kerosene (ATK) Depot, to store the product.

The project, being a Depot Facility (a Petroleum Products Storage Depot), shall involve:

1. Receiving of Petroleum Products:  
Aviation Turbine Kerosene (ATK) - Jet Oil, from Trucks;
2. Storage of the received Aviation Turbine Kerosene (ATK) from Trucks in Six (6) Storage Tanks of 3,230,200 Litres total effective storage capacity.
3. Loading of the products to road tankers for delivery to airlines.

This product will come from both local and imported sources.

In line with the relevant Federal Government of Nigeria Legislations (Environmental Impact Assessment Act No. 86 of 1992, and Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) 2002) and its policy of carrying developmental activities in an environmentally sustainable manner, **A. A. Rano Nigeria Limited Limited** commissioned Messrs Borky S. G. Bakre & Associates Limited, an environmental and engineering firm, to carry out this Environmental Impact Assessment (EIA) of the proposed depot project.

The EIA study is to assess the potential environmental impacts during the pre-construction, construction and operation of the petroleum product depot on the environment. It is also to

recommend practicable and cost-effective mitigation measures against identified adverse effects of the proposed depot project on the environment.

Arising from the mitigation measures proffered to the impacts identified, a comprehensive Environmental Management Plan (EMP) has been developed for the operational phase of the proposed project.

It should be noted that this Environmental Impact Assessment (EIA) Report depicts the interaction between the proposed project and the social and biophysical environment.

## **1.7 LEGAL AND ADMINISTRATIVE FRAMEWORK**

The implementation of developmental activities in Nigeria is guided by several regulations. These regulations include both local and international conventions, and treaties, which relate to environmental conservation and protection. The relevant regulations have to be adequately considered in the process of preparing an EIA report or studies in preparing this EIA report, the relevant regulatory requirements were adequately considered. A summary of the regulations is presented below: -

### **1.7.1 DEPARTMENT OF PETROLEUM RESOURCES (DPR) GUIDELINES**

The Petroleum Act of 1969 governs the Oil and Gas operations in Nigeria while its subsequent regulations made in pursuant to section 9 (i) B (ii) of the Act empowers the Minister of Petroleum Resources to make regulations for the prevention of pollution of water courses and the atmosphere.

The Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN), which was further reviewed in 2002 to adequately take into cognisance the need to enhance environmental resources prudently in the areas of its operation, was published by DPR in 1991. DPR's EGASPIN requires that EIA study to assess all actions that will result in physical, chemical, biological, cultural and social (including health impact) modifications of the environment due to a new development/project, be undertaken and to predict their potential environmental impacts on the environment. Among the projects that require mandatory EIA studies by DPR regulations is:

“Construction of Product Depot with combined capacity of 80,000 barrels and located within 3Km of any commercial, individual or residential area”.

Based on the foregoing, the proposed ATK Depot project, with a combined storage capacity of 2,654,990 Litres (16,698 barrels) (much less than the 80,000 barrels (12,720,000 Litres) minimum specified in the DPR regulations as requiring compulsory EIA), may not necessarily fall within the Mandatory EIA study list.

## 1.7.2 NATIONAL AND LOCAL REGULATIONS

The specific laws and regulations that affect the proposed project are as follows:

1. The Federal Environmental Protection Agency (FEPA) Act, CAP 131, LFN, 1990 (as amended by Act No 59 of 1992) - mandates FEPA (now Federal Ministry of Environment) to protect, restore and preserve the ecosystem of the Nigerian environment.

In fulfilling this task, the Agency (now ministry) established environmental guidelines and standards for the purpose of abating and controlling all forms of environmental pollution and also set the necessary machinery for the establishment of State Environmental Protection Agencies (SEPA's).

Among the guidelines set, are:

- (i) National Policy on Environment (Revised), 2017 - this instrument establishes guidelines and strategies for achieving policy goals for sustainable development.
- (ii) Guidelines and Standards for Environmental Pollution Control in Nigeria (1991) - this instrument is used to monitor and control pollution from manufacturing industries in order to improve the quality of the environment and also free it from pollutants and other environmental hazards.
- (iii) S. I. 15. Waste Management Regulations (1991) - this instrument contains guidelines for the management of solid and hazardous wastes.
- (iv) S. I. 8 National Environmental Protection (Effluent Limitation) Regulations (1991) - this instrument expresses the need for:
  - a) Installation of anti-pollution facilities/devices in industries;
  - b) Treatment of effluent;
 and in addition, gives Sectoral Effluent Limitation Standards and the penalties for contravention.
- (v) S. I. 9 National Environmental Protection (Pollution Abatement in industries and Facilities Generating Wastes) Regulation 1991 - this instrument contains regulations on:
  - a.) Restriction on the release of toxic substances and unusual accidental discharge by industries;

- b.) Establishment of pollution monitoring units in industries;
  - c.) Submission of list of chemicals used in the industry to the nearest FMENV/SEPA office;
  - d.) Establishment of contingency plan approved by the Agency and also safety of workers;
  - e.) Storage, treatment and transport of harmful toxic wastes; solid wastes disposal and generator's liability;
  - f.) Permissible limits of discharges into public drainage, release of gaseous matters and strategies for waste minimization/abatement;
  - g.) Industrial layouts in each state and maintenance of surroundings;
  - h.) Agency's demand of Environmental Audit Reports (EAR) from existing industrial facilities and also penalties for contravention.
- (vi) EIA Act No 86 of 1992 - this EIA law makes Environmental Impact Assessment (EIA) mandatory for any new project. The EIA makes it possible to be alerted beforehand of likely negative impacts of a new venture so that mitigation measures can be put in place if the project is to go on.

It also specifies the guidelines for conducting and reporting Impact Assessments:

- a) EIA – Sectoral Guidelines – this specifies detailed guidelines for conducting Impact Assessment on Sectoral basis.

The objectives of any Environmental Impact Assessment (EIA) are contained in section 1 page A979 of the Environmental Impact Assessment Act;

Section 1 (a) states:

“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;”

Section 2 of the EIA Act places restriction on public or private project without prior consideration of the environmental impact; viz: 2- (1) –

“The public or private sector of the economy shall not undertake or embark or authorize projects or activities without prior consideration, at early stages, of their environmental effects;”

Sections 3 to 5 pages A980-A981 of EIA Act however contain the following classifications:

- i. Identification, etc., of significant environmental issues;
- ii. Minimum content of Environmental Impact Assessment;
- iii. Detail degree of environmental significance.

The schedule to section 13 of the EIA Act specifies the “Mandatory Study Activities” and items 12(c) and 12 (e) under PETROLEUM state:

“(c) Construction of oil and gas separation; processing, handling, and storage facilities”.

“(e) Construction of product depots for the storage of petrol, gas or diesel (excluding service stations), which are located within 3 kilometres (km) of any commercial, industrial or residential areas and which have a combined storage capacity of 60,000 barrels or more”. *1 barrel = 159 Litres (0.159 Cubic Metres).*

The proposed ATK Depot project, based on its scope and also combined storage capacity of 2,654,990 Litres (much less than the 60,000 barrels (9,540,000 Litres) minimum specified in the Act to make the list), may not necessarily fall within the Mandatory EIA study list; we have decided to register the project with the Ministry for the necessary guidance that will make its implementation wholly acceptable.

The above documents, in one way or the other, impose restriction on the release of toxic substances into the environment and the responsibility of all industries whose operations are likely to pollute the environment.

2. The petroleum Act 1969: - regulates pollution in oil and gas operations;
3. Mineral Oils (safety) Regulations, 1962: - It regulates the safe discharge of noxious or inflammable gases in oil wells, spillages of oil or gas leakages;
4. Petroleum (Drilling and Production) Regulations, 1969;
5. Oil in Navigable Waters Act, 1968: - This is the convention for prevention of pollution of the sea by oil, 1954; and amended in 1962;

6. Oil Terminal Dues Act, 1969: - This Act implements the conventions on the continental shelf (Geneva, 1958). It prohibits oil discharge into the sea from pipelines, vessels or other operations used for oil transfer;
7. Petroleum Refining Regulation, 1974;
8. Labour Act, 1979; and Factories Act, 1987;
9. Employees Compensation Act (ECA) 2010;
10. Harmful Wastes (specified Criminal Provisions, etc) Act CAP HI LFN 2004;
11. National Inland Water Ways (NIWA) Act 13 of 1997;
12. Public Health Act, 1958; and Public Health Laws, 1963;
13. Land Use Act CAP L5 LFN, 2004;
14. National Environmental (Surface and Groundwater Quality Control) Regulations, 2011;
15. National Environmental (Wetlands, River Banks and Lake Shores) Regulations, 2009;
16. National Environmental (Watershed, Mountainous, Hilly and Catchment Areas) Regulations, 2009;
17. National Environmental (Permitting and Licensing System) Regulations, 2009;
18. National Environmental (Noise Standards Control) Regulations, 2009;
19. Oil Spill Recovery, Clean-up, Remediation, and Damage Assessment Regulations, 2011;
20. Oil Spill and Oil Waste Management Regulations, 2011;
21. Nigerian Urban and Regional Planning Act. No.10 of 2010;
22. National Oil Spill Detection and Regulatory Agency (NOSDRA) Act 15 of 2006;
23. National Environmental Standards Regulation and Enforcement Agency (NESREA) Act 25 of 2007;
24. Abandonment Guidelines, 1995;
25. Public Health Law Cap 103 LFN 1990;
26. National Guidelines on Waste Disposal through Underground Injection 1999;
27. National Guidelines on Spilled Oil Fingerprinting, 1999;
28. National Guidelines on Registration of Environment Friendly Products, 1999;
29. National Guidelines and Standards for Water Quality in Nigeria, 1999;
30. National Guidelines for Environmental Audit, 1999;
31. National Guidelines on Environmental Management System, 1999;
32. Penal Act CAP 53 LFN 2008; (CAA)
33. Civil Aviation Act 2006;
34. National Policy on Occupational Safety and Health, 1999;



### 1.7.3 TERRITORIAL LAWS

(i.) Federal Capital Territory Act CAP 128 LFN 1990

The area contained in the Federal Capital Territory shall, as from the commencement of this Act, cease to be a portion of the States concerned and shall thenceforth be governed and administered by or under the control of the Government of the Federation to the exclusion of any other person or authority whatsoever, and the ownership of the lands comprised in the Federal Capital Territory shall likewise vest absolutely in the Government of the Federation.

This Act, establishes for Nigeria, a Federal Capital Territory and provides for the constitution of a Federal Capital Development Authority (FCDA), to exercise the various powers set out in this Act and to execute other projects and provide for the laws applicable to that Territory.

(ii.) Abuja Environmental Protection Board (AEPB) Act No. 10 of 1997 - Statutory Legislation applicable to 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 all ecological processes essential for the preservation of biological diversity.
- Protection and improvement in air, water, land, forest and wildlife in the ecology of the FCT.
- Municipal Liquid and Solid waste Collection and Disposal/Sanitation Management Services including i.e. connection of plot to the Central Sewer line.
- Pollution control and Environmental Health – Fumigation and Vector Control Services.

### 1.7.4 INTERNATIONAL CONVENTIONS AND PROTOCOLS

There are several international treaties and regulations that govern aquatic, marine and wildlife conservation and pollution. The relevant ones are presented below:

- (a) **Convention on the Conservation of Migratory Species of Wild Animals** - more commonly abbreviated to just the Convention on Migratory Species (CMS) or the **Bonn Convention**-aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of

wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include over 100 Parties from Africa, Central and South America, Asia, Europe and Oceania. The Convention was signed in 1979 in Bad Godesberg, a suburb of Bonn (hence the name), and entered into force in 1983. The depositary is the government of the Federal Republic of Germany.

The Bonn convention's field of action is the conservation and management of migratory species (including water and other wetland species) and promotion of measures for their conservation, including habitat conservation.

- (b) **Convention on Biological Diversity (CBD)**, known informally as the **Biodiversity Convention**, is a multilateral treaty. The Convention has three main goals:

conservation of biological diversity (or biodiversity);

sustainable use of its components; and

fair and equitable sharing of benefits arising from genetic resources

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.

2010 was the International Year of Biodiversity. The Secretariat of the Convention on Biological Diversity is the focal point for the International Year of Biodiversity. At the 2010 10th Conference of Parties (COP) to the Convention on Biological Diversity in October in Nagoya, Japan, the Nagoya Protocol was adopted.<sup>[1]</sup> On 22 December 2010, the UN declared the period from 2011 to 2020 as the UN Decade on Biodiversity. They, hence, followed a recommendation of the CBD signatories during COP10 at Nagoya in October 2010.

It deals much more with the conservation of biological diversity. The sustainable use of earthly components and the fair and equitable sharing of benefits arising out of utilization of genetic resources, including appropriate transfer of relevant technologies and taking up all rightful ownership of those resources and technologies by appropriate funding;

- (c) International Convention for the Prevention of Pollution of the Seas by Oil, 1954 (Oil Pol, 1954).

The first international convention for the prevention of oil pollution of the sea, making provision especially for the control of oily wastes;

- (d) Convention of the High Seas, 1958.

The convention imposes a duty to prevent marine pollution. It requires every state or country to draw up regulations to prevent pollution of the seas;

- (e) International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990.

The convention came into force in 1995. The convention recognizes the serious threat posed to marine environments. It takes into consideration the polluter-pays-principle and the importance of international instruments on liability and compensation in case of oil damage;

- (f) International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992 (IOPC Fund).

The fund is adopted to provide additional compensation for various types of oil pollution and transfer some of the economic consequences to the owner of the oil cargo, as well as the ship owner. Compensation payable under the fund is limited to 450 million francs per incident, and an aggregate of 450 million francs for pollution damages resulting from a natural phenomenon of an exceptional, inevitable and irresistible character;

- (g) Abidjan Convention and MARPOL, 73/78.

The Marine Environment as well as Coastal Zones and Inland Waters of West and Central Africa are covered by the convention for the co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (the Abidjan Convention) signed March, 1981.

The MARPOL, 73/78; supersedes Oil Pol, 1954; cited above and it is intended to deal with all forms of international pollution of the sea from ships other than dumping;

- (h) **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter** 1972, commonly called the "**London Convention**" or "LC '72" and also abbreviated as **Marine Dumping**, is an agreement to control pollution of the sea by dumping and to encourage regional agreements supplementary to the Convention. It entered into force in 1975. As of 2013, there were 87 Parties to the Convention.

- (i) **African Convention on the Conservation of Nature and Natural Resources** is a continent-wide agreement signed in 1968. It supersedes the Convention Relative to the Preservation of Fauna and Flora in their Natural State of 1933 and has been superseded by the African Convention on Conservation of Nature and Natural Resources (revised) signed in Maputo in 2003.

- (j) United Nations Guiding Principles on the Human Environment, 1997.

- (k) WHO Health and safety component of EIA, 1987.
- (l) WHO Health for All strategy and policy, 1978.
- (m) IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts Jan 1, 2012.
- (n) IFC Performance Standard 2: Labor and Working Conditions.
- (o) IFC Performance Standard 3: Resource Efficiency and Pollution Prevention.
- (p) IFC Performance Standard 4: Community Health, Safety, and Security.
- (q) IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- (r) United Nations Framework Convention on Climate Change (UNFCCC), 1992

The ultimate objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." It states that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

- (s) Kyoto Protocol on Climate Change, 1997  
The Kyoto Protocol is an international treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that global warming is occurring and it is extremely likely that human-made carbon dioxide (CO<sub>2</sub>) emissions have predominantly caused it.
- (t) Conservation on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 1998  
This Convention, also referred to as Aarhus Convention, adopts a rights-based approach and requires parties to guarantee rights of access to information, public participation in decision-making and access to justice in environmental matters. It also refers to the goal of protecting the right of every person of present and future generations to live in an environment adequate to health and well-being, which represents a significant step forward in international law.
- (u) ISO 14001 Environmental Management System (EMS) 2015  
ISO 14001:2015 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. An Environmental Management System (EMS) consists of a framework that helps a company achieve its environmental goals through consistent control of its operations. The assumption is that this increased control will improve the environmental

performance of the company. The EMS itself does not dictate a level of environmental performance that must be achieved; each company's EMS is tailored to the company's business and goals.

- (v) The International Union for Conservation of Nature and Natural Resources (IUCN), 1996.

The International Union for Conservation of Nature (IUCN; officially International Union for Conservation of Nature and Natural Resources) is an international organization working in the field of nature conservation and sustainable use of natural resources. It is involved in, data gathering and analysis, research, field projects, advocacy, and education. IUCN's mission is to influence, encourage and assist societies throughout the world, to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

- (x) Basel Convention on the Control of Trans-Boundary Movement of Hazardous Wastes and their Disposal, 1987

This convention, usually referred to as the Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous wastes from developed to Less Developed Countries (LDCs). It does not, however, address the movement of radioactive wastes. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.

### **1.7.5 A. A. RANO NIGERIA LIMITED'S HSE POLICY**

In line with the Company's HSE Policy, which expresses that it is committed to the sustenance of "an equal to none" Quality, Safety, Health and Environmental (QSHE) standards - performing every aspect of its business in compliance with applicable laws, regulations and industry standards, A. A. Rano Nigeria Limited undertook the preparation of this Environmental Impact Assessment (EIA) Report.

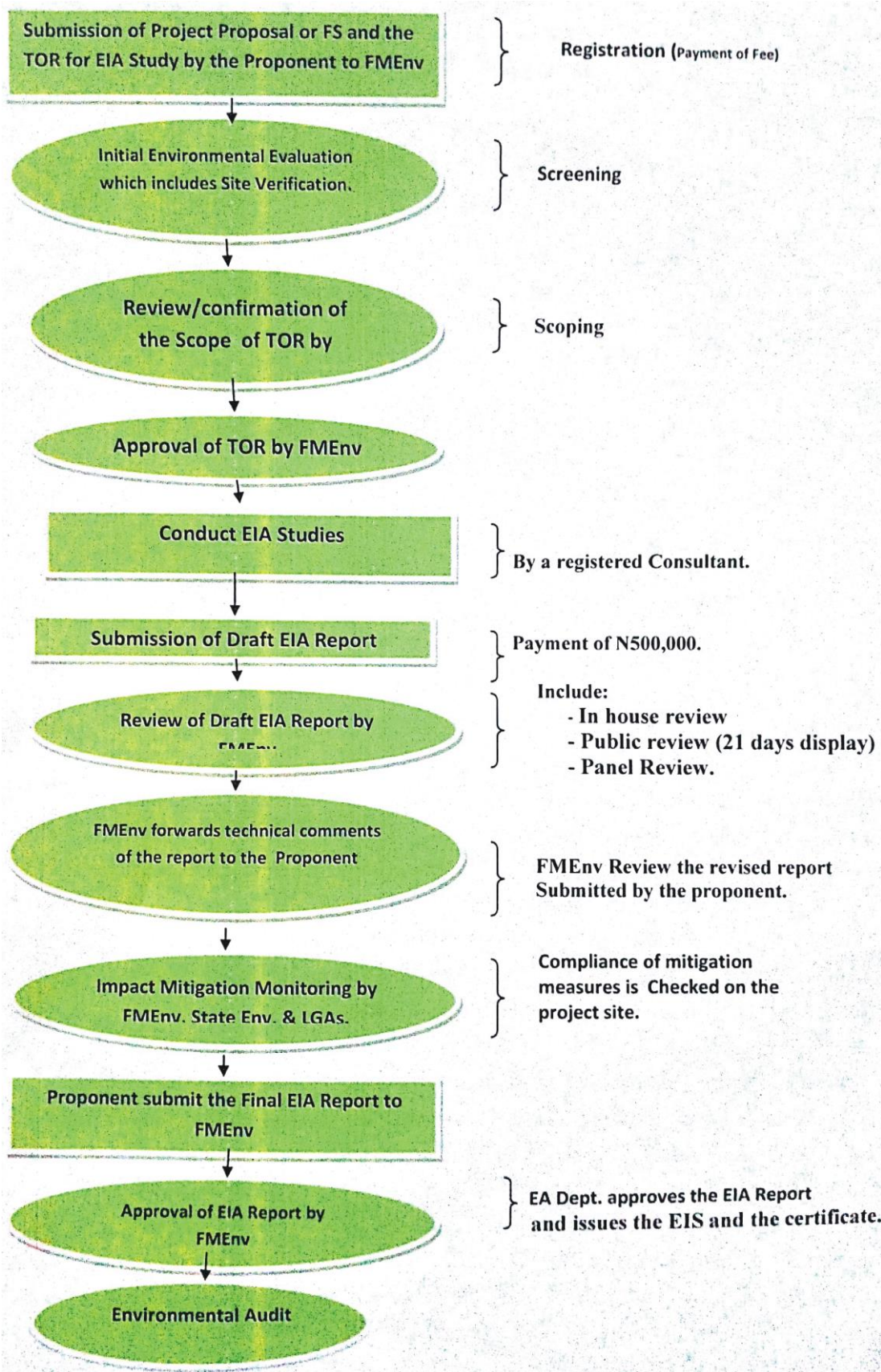


Figure 1.6: EIA Flow Chart

## 1.8 OBJECTIVES OF THE EIA STUDY

The incorporation of sound environmental consideration into developmental processes is a requirement in Nigeria now, and it is consistent with the worldwide sustainable development programme. All industrialization processes are associated with significant impacts on the ecosystem. Oil and Gas Industry (up-stream and down-stream) activities including the Petroleum Product Depot planned for Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, have potential impacts on the environment.

Thus, the broad objective is to achieve the desired goal of protecting the environment through the EIA study process (see Figure 1.6 for EIA Prucess Flow Chart). However, an Environmental Impact Assessment (EIA), is generally meant for assessing projects with lesser environmental impacts. This preliminary analysis is undertaken to identify the impacts associated with the proposed development and the means of mitigation.

The EIA, is an important tool for sound decision making and for achieving sustainable development. The processes involved to achieve this include:

- a. Establishing and documenting the physical and biophysical setting of Aviation Village Area of FCT. This will provide adequate baseline data against which a long-term environmental monitoring can be planned to control actions that may result in physical, biological, chemical, cultural and socio-economic modification of the environment as a result of this industrial development;
- b. Establishing and documenting the environmental resources' sensitivities of the area, by identifying salient environmental parameters that are prevalent and have direct bearing on the project. These include noise, ambient air quality, aquatic systems, rainfall, etc;
- c. Identifying the mitigation and control measures to minimize the unavoidable negative impacts on the ecosystem;
- d. Developing a cost-effective and a sound Environment Management Plan (EMP), and Project Monitoring Plan to enhance waste management that will be adequate for the receiving environment;
- e. Incorporating the approved EIA concerns into the design of the project;
- f. Assessing and providing data on the status quo of the facilities, people and communities in the project area together with general socio-economic considerations of the existing environment and people;

The above set out objectives shall be adhered to by the Consultants and A. A. Rano Nigeria Limited's staff, in order to meet standards and regulations provided by the nation, the territorial and international protocols. The relevant regulations were reviewed under the legal framework.

## **1.9 TERMS OF REFERENCE**

The Terms of Reference (TOR) for this EIA study developed by A. A. Rano Nigeria Limited is as follows:

- i. Outlining the general scope of EIA study including the overall data requirements on the proposed project and affected environment;
- ii. Defining the procedures / protocols for identification and assessment of associated and potential impacts;
- iii. Selecting appropriate mitigation measures for such impacts and developing an effective Environmental Management Plan (EMP) for the project with greater emphasis on monitoring during the operational phase;
- iv. Defining the framework for consultation with relevant stakeholders, that is, communities, regulators, project team and others. The interaction and integration of views arising from such consultation process;
- v. Defining the relevant framework for legal and administrative requirements for the project.

## **1.10 STRUCTURE OF THE REPORT**

This EIA has Nine (9) chapters as enunciated in the Department Petroleum Resources' EGASPIN, which are outlined below:

Chapter One - Introduction - Background Information, Administrative and Legal Framework, Terms of Reference (TOR).

Chapter Two - Project Justification/Alternatives - Needs, Value and Envisaged Sustainability.

Chapter Three - Project and Process Description

Chapter Four - Description of the Environment

Chapter Five - Potential and Associated Environmental Impacts

Chapter Six - Mitigation Measures

Chapter Seven - Environmental Management Plan (EMP)

Chapter Eight – Decommissioning and Abandonment Plan



Chapter Nine - Conclusion and Recommendation.

Reference

Appendices

### **1.11 DECLARATION**

**A. A. Rano Nigeria Limited** declares that it has prepared this report using the best resources and method available and therefore takes responsibility for implementation of the Environmental Management Plan (EMP) drawn up and any other regulatory requirements as prescribed by law.

## CHAPTER TWO

### 2.0 PROJECT JUSTIFICATION

#### 2.1 Introduction

Industrial and Economic development of any nation depends on adequate and affordable energy supply. Fossil fuels are currently the most important sources of energy worldwide, and as such, non interruption of fuel supply to the country would go a long way in putting Nigeria on its way to being an industrialized nation.

#### 2.2 Need for the Project

Nigeria currently has four (4) petroleum refineries with a combined installed refining capacity of about 18 million litres per day as against 34 million litres of petroleum products required daily nationally. Of the stated 18 million litres installed products refining capacity in Nigeria, the refineries are refining only about 50 percent of that, due to unending turnaround maintenance programmes, pipeline disruption and constant breakdown of the relatively old equipment at the refineries. In order to bridge this gap in local supply of petroleum products, importation of the products is needed. Unfortunately, there is the absence of adequately safe storage facilities in the country; the need therefore arises for the project. The planned **A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) Depot Facility** is in response to the existing lacuna in aviation fuel supply and distribution needed to sustain the Nigerian Aviation Industry, which is growing in outreach capacity. Thus, the planned **A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) Depot Facility** is needed to:

1. Provide adequate and safe storage facility to ensure the availability of Aviation Fuel to operating aircrafts;
2. Provide an appropriate platform for the efficient distribution of Aviation Fuel from the storage facilities through retailers to operating aircrafts;
3. Contribute to the efficient supply of required energy needs towards the attainment of the vision 2020 goals;
4. Generate gainful employment opportunities, thereby contributing towards wealth creation;
5. Provide Government with revenue for the provision of social services through the payment of taxes;
6. Generate further earnings for investors / shareholders through profits, thereby creating further opportunities for investments and wealth creation.

## 2.3 Value and Sustainability of the Project.

### 2.3.1 Value of the Project

The value of the project is here assessed based on the positive impact of the project's implication on the following: 1.) Socio-Economy; and 2.) Environment and Life Style.

#### 1.) Socio-Economy:

Preliminary estimates show that the project value, in monetary terms, will be over One Billion Three Hundred Million Naira (₦1,300,000,000=), which will be financed through equity and loan. The local economy will benefit to a large extent through various contracts and subcontracts. In addition, employment opportunities at various phases of the project for skilled, semi-skilled and unskilled labour shall be provided. Finally, revenue shall be generated from the storage and distribution of refined liquid petroleum products in form of taxes and levies to both the Federal Governments and Territorial Authorities, and in addition, revenue generation by the Local Government; Income from employment of local hands would enhance the economic condition of the host community.

#### 2.) Environment and Life Style:

There will be aesthetic improvement of the environment and also upgrade in the land use pattern. There shall be provision of feeder roads, continued extension of electric power supply to the work site, provision of potable water, etc, which will uplift the overall infrastructural status of the neighbouring community.

### 2.3.2 Sustainability of the Project

This is looked at from the following perspectives: - i) Technical, ii) Economic, iii) Environmental, and iv) Social/Political Sustainability.

#### i) Technical Sustainability

- a.) The project proponents have a track record of several well implemented projects in the past.
- b.) The Company shall utilize the Best Available Technology (BAT) in the engineering designs and comply with Standard Codes of Practice (SCoP) in implementation, throughout the different phases of the project.
- c.) Facilities and structures associated with the project will be built to the highest possible safety and environmental standards; and, they are estimated to last for well over twenty-five (25) years.
- d.) Besides the routine maintenance, which will be an ongoing exercise, general scheduled plant maintenance of the facilities is planned to take place annually.

**ii) Economic Sustainability**

- a.) The petroleum products for which the tanks are being built are in high demand and will remain so for at least twenty-five (25) years; and so, with regular and sustained demand for these highly essential products, also comes the regular and sustained earnings by the proponents. The airline business is a continuously evolving industry.
- b.) Through the above, the economy of the host communities will be thereby improved, as more people will be gainfully employed and spendable income will increase. The foregoing will improve the facility's acceptability within the community and thus by extension ensure its sustainability.

**iii) Environmental Sustainability**

- a.) Environmental, Health, Safety and Social considerations shall be given adequate attention in the implementation of the project.
- b.) The Company will do everything possible to avoid spillage of products into the environment, and if such should accidentally occur, immediate cleanup shall be undertaken in line with approved standard procedures.
- c.) The Company shall undertake regular monitoring of its activities to easily detect parameters that may be out of compliance, and then promptly take appropriate actions.
- d.) Through the project implementation, the general environment is now being hereby improved both environmentally and aesthetically.
- e.) An Environmental Management Plan (EMP) being developed for the proposed facility shall be strictly complied with throughout the life of this project.
- f.) In implementing this project, the proponents shall seriously consider the conservation, protection and sustainable use of environmental resources.

**iv) Social Sustainability**

- a.) Continued stability of the country's polity due to the present democratic dispensation and the sustained activities of the Company, guarantee the project's sustainability.
- b.) The Company shall from time-to-time relate with neighbouring communities throughout the life of this project.

- c.) The Company shall implement sustainable community focused projects, in collaboration with the host community, in the discharge of its Corporate Social Responsibility (CSR).

## 2.4 Project Alternatives

In line with Governments' Regulatory Requirements, an analysis of reasonable alternatives to various components of the proposed project must be carried out. The Alternatives' Analysis identifies the reason for selecting a given policy, plan, or program rather than others that could involve different aspects.

The objective is to ensure that the most environmentally sound, cost-effective and practical means of achieving the desired project goals and objectives has been selected. This is done by using the information developed through the affected-environment-investigation (social considerations, etc.) and impact assessment in the analysis process.

The alternatives considered, which cut across construction technology, site selection and environmental regulatory issues include the, "Proposed Site / Location and Technology" and "Alternative Site" options.

**The analyzed project alternatives are briefly discussed below:**

### 2.4.1 Proposed Site / Location and Technology

Using the proposed site and project layout technology, it is anticipated that this project will be better sited as proposed for the following reasons:

Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, is part of an area, within the vicinity of Abuja Airports, has been laid out and is being allotted to operators / businesses for the purposes of establishing Aviation related undertakings, including the establishment of Fuel Depots. In addition, the location is well positioned along both the International and Domestic Airports and has excellent road network for easy distribution of the product to aviation customers.

More so, Abuja, being the seat of the Federal Government and the location of some of the largest and busiest commercial airports in Nigeria and with developed facilities, is a great choice for citing the project, both in terms of location for receiving supplies and, having and handling sizeable patronage. Therefore, both in terms of economics and environmental considerations, the chosen project location is appropriate. Moreover, the proponents already have petroleum products' depots in other locations within Nigeria, including Kano and two (2) in Lagos state.

### 2.4.2 Alternative Site

Considering alternative sites for the siting of the project, the following locations were looked on: i.) Lagos, ii.) Port Harcourt, and iii.) Kaduna, which also have airport facilities as does Abuja.

The proponent, already have petroleum products' depots in other locations within Nigeria, including Kano and two (2) in Lagos state, considered expanding its operations to other cities like Abuja, Port Harcourt or Kaduna, with viable airports. However, siting this particular project in Abuja, where an appropriately situated land has already been allocated by FCDA and paid for by the Company is readily available, comes with less hindrances; and of course, the market is readily available in Abuja, therefore, distribution will be quite cheap and within reasonable time.

## 2.5 Project Options

**The project Options were selected based on the following criteria:**

### 2.5.1 No Project Option

By the No Project option, the construction of the tank farm will not proceed. The proposed project site will either be abandoned or alternative use found for it. If abandoned, there may be no change in the physico-chemical parameters at the site and surrounding environment, but there may likely be change in the biophysical characteristics of the site and consequently, social characteristics of the site and surrounding environment. But if used for other purposes, the possible changes will be determined based on the nature of the particular project. In whichever way, while the "No Project" option will eliminate associated and potential negative impacts within the area of influence of the project, this option will go against the Federal Government initiative to increase the availability and supply of petroleum products to the country. The lightering facility that shall be provided by this facility to other tank farms will be lost, so also is the potential revenue that will accrue to government.

### 2.5.2 Do Project, or Implement Project, Option

By the "Go Ahead, or Implement Project," option, the project would be implemented in its present designed form. With this option, all the identified associated and potential impacts are likely to happen, but with the planned mitigation measures planned along with the project, such impacts will be properly brought under control.

### 2.5.3 Delayed Project Option

By the “Delayed Project” option, the project would be postponed to a later date. Similar to the “No Project” option, associated and potential negative impacts within the area of influence of the project would be avoided; however, this will be temporary. It would have the advantage of allowing for further project planning and time to implement mitigation measures with longer lead times.

A “Delayed Project” option shall cause:

- a. Unanticipated increase in the cost of the project due to inflation;
- b. Demobilization of all processes already put in place for the project, without any justified benefit.
- c. All these, and other related problems make it unattractive to adopt the “Delayed Project” option.

2.5.4 Following the careful review of three options highlighted above, the second option, (“2.5.2 – **Do Project, or Implement Project, Option**”), was adopted.

## CHAPTER THREE

### 3.0 PROJECT DESCRIPTION

#### 3.1 TYPE OF PROJECT

The proposed project - A. A. Rano Nigeria Limited Aviation Turbine Kerosene (ATK) - Jet Oil Depot Facility - is a Refined Petroleum Products depot, designed to handle products from both local and imported sources (receiving products from refineries both locally and through importation). The facility will receive Aviation Turbine Kerosene (ATK) - Jet Oil, store the Aviation Turbine Kerosene (ATK) - Jet Oil in the tank farm, and load the Aviation Turbine Kerosene (ATK) - Jet Oil into tankers for onward supply / fuelling of aircrafts.

The proposed project is to be constructed on a parcel of land along Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria. The Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, is part of an area, within the vicinity of Abuja Airports, has been laid out and is being allotted to operators / businesses for the purposes of establishing Aviation related undertakings, including the establishment of Fuel Depots, that will receive, store and dispense Aviation Fuel through Refuellers to Aircrafts.

The designed life of the proposed refined liquid petroleum products tankfarm facility is twenty-five (25) years. The proposed facility design shall take into consideration, necessary operational factors to ensure that optimum product reliability and throughput, and community / environmental welfare and safety in the proposed project area of influence is achieved through quality assurance and traffic / logistics management.

#### 3.2 Project Location

The Proposed Aviation Turbine Kerosene (ATK) Depot is to be located on a parcel of land with the following geo-coordinates: **8°59'9.208"N to 8°59'19.846"N and 7°16'9.629"E to 7°16'22.542"E**, within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria.

See Figures 1.1 to 1.5 and Plates 1.1 to 1.8, for details.

The site of the proposed facility is bounded by the following:

- 1.) On the Northern Axis by Nnamdi Azikiwe International Airport Road;
- 2.) On the Southern Axis by a vacant plot belonging to A. A. Rano Nigeria Limited;
- 3.) On the Eastern Axis by a vacant plot;
- 4.) On the Western Axis by A. A. Rano Nigeria Limited Filling Station.

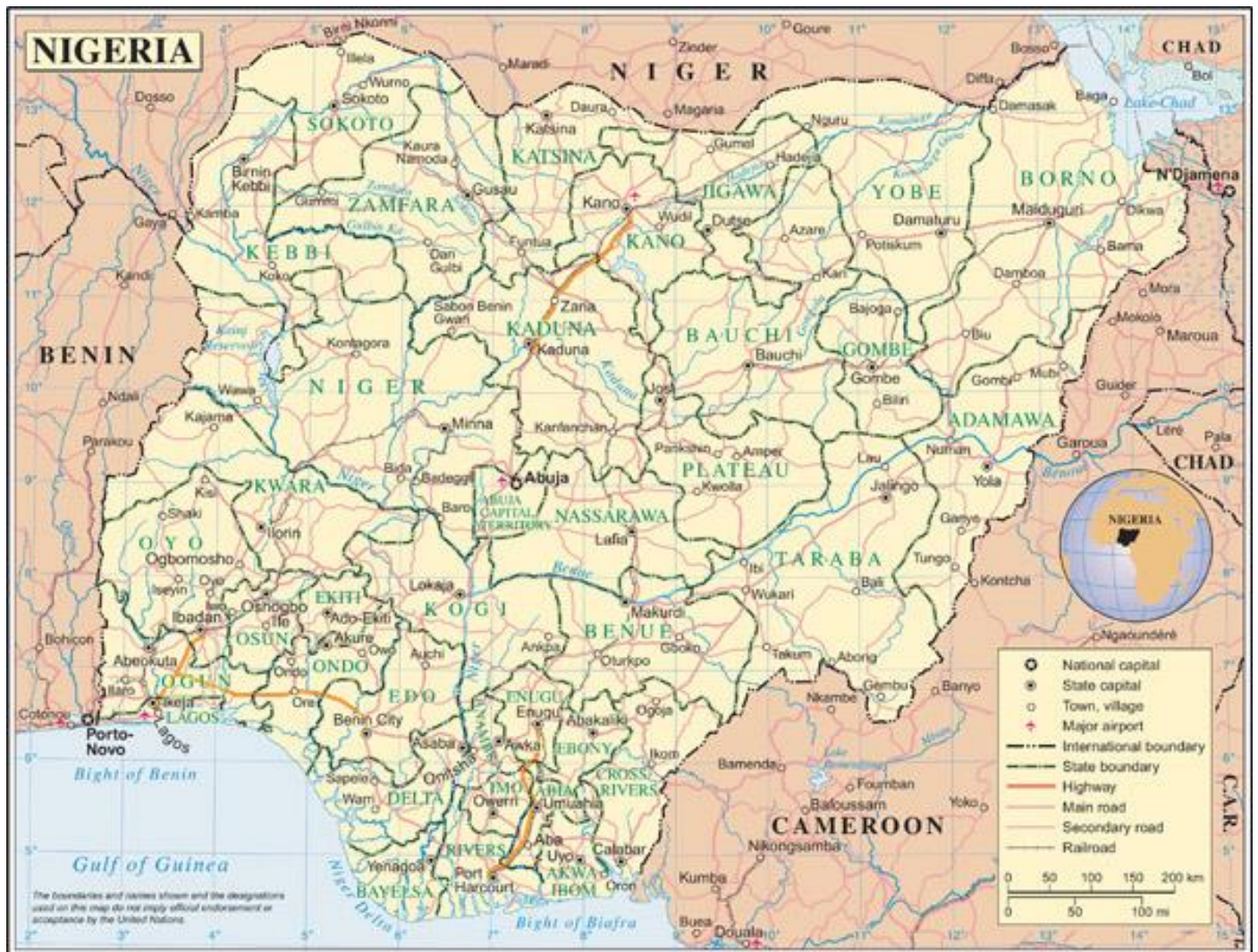
The satellite photo of the proposed project location, the survey map of the general area, and the general layout of the proposed A. A. Rano Nigeria Limited's Aviation Turbine Kerosene



(ATK) along Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria. The Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria, are shown along with other diagrams below. See Figures 3.1 to 3.4 below.

The proposed Aviation Turbine Kerosene (ATK) site occupies a total land area of 1.2377 Hectares.

Politically, Nigeria is divided into 36 states and the Federal Capital Territory, Abuja . The divisions are as follows:



Source: <http://www.vidiani.com>

Figure 3.1: Political Map of Nigeria Showing Abuja, FCT

**SOME PHOTOS OF LOCATIONS AND FACILITIES ON AND AROUND THE PROPOSED PROJECT SITE**



**Plate 3.1: Proposed Project Site from the North-Western Axis**



**Plate 3.2: Proposed Project Site from the North-Western Axis**



**Plate 3.3: Proposed Project Site from the Northern Axis**



**Plate 3.4: Proposed Project Site from the South-Eastern Axis**



Plate 3.5: Proposed Project Site from the North-Eastern Axis



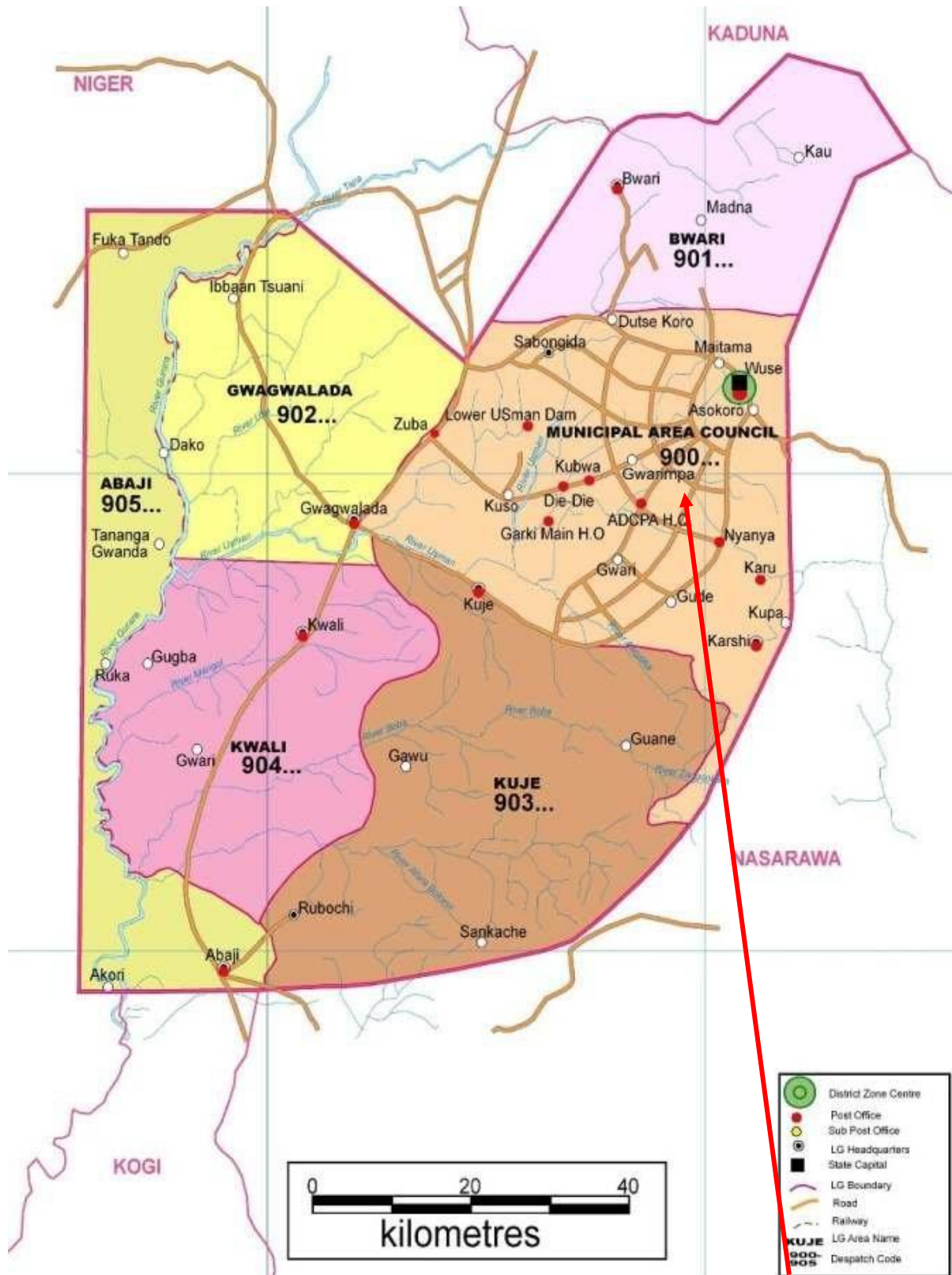
Plate 3.6: Proposed Project Site from the North-Western Axis



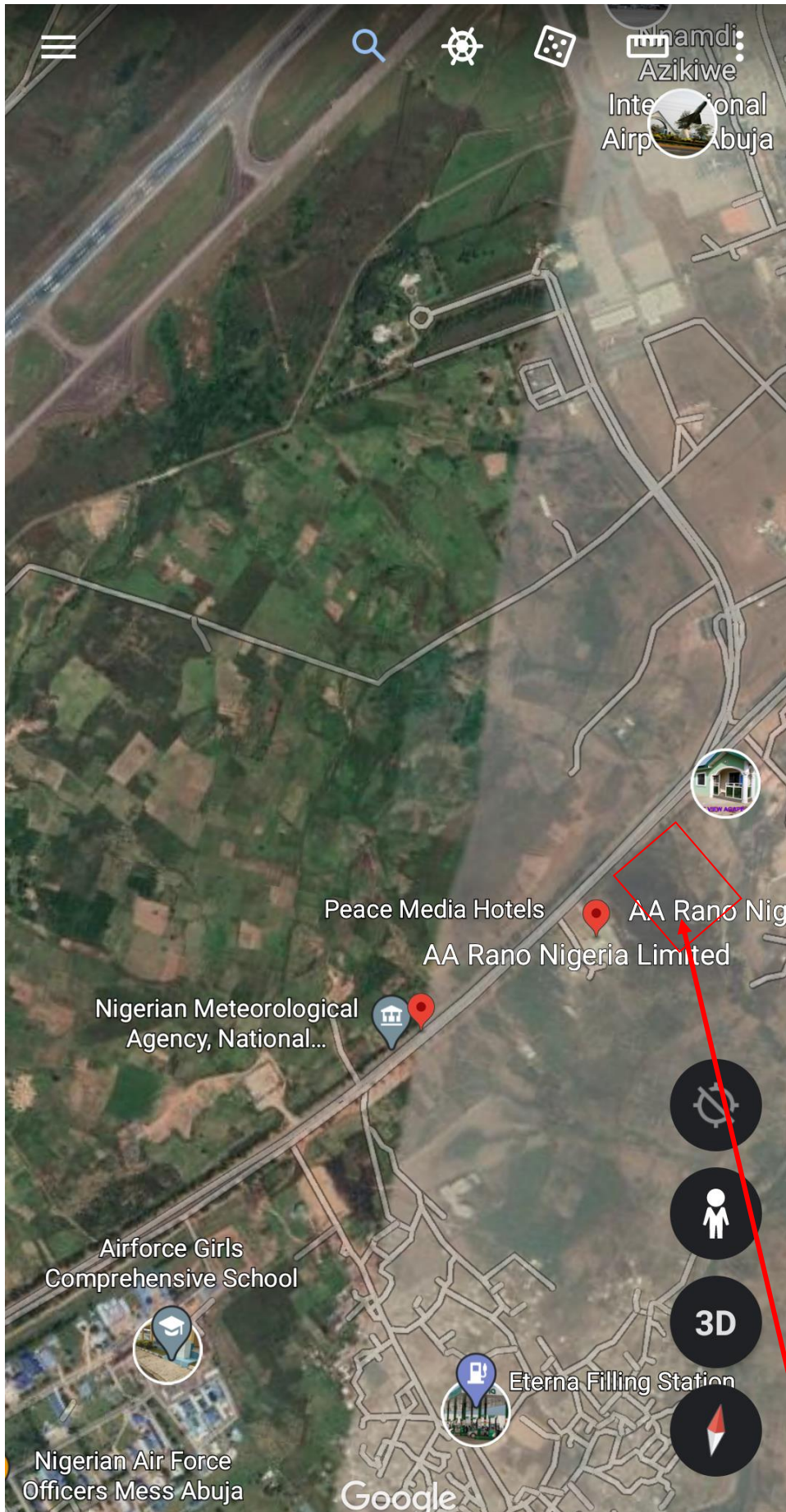
Plate 3.7: Southern Axis of the Proposed Project Site



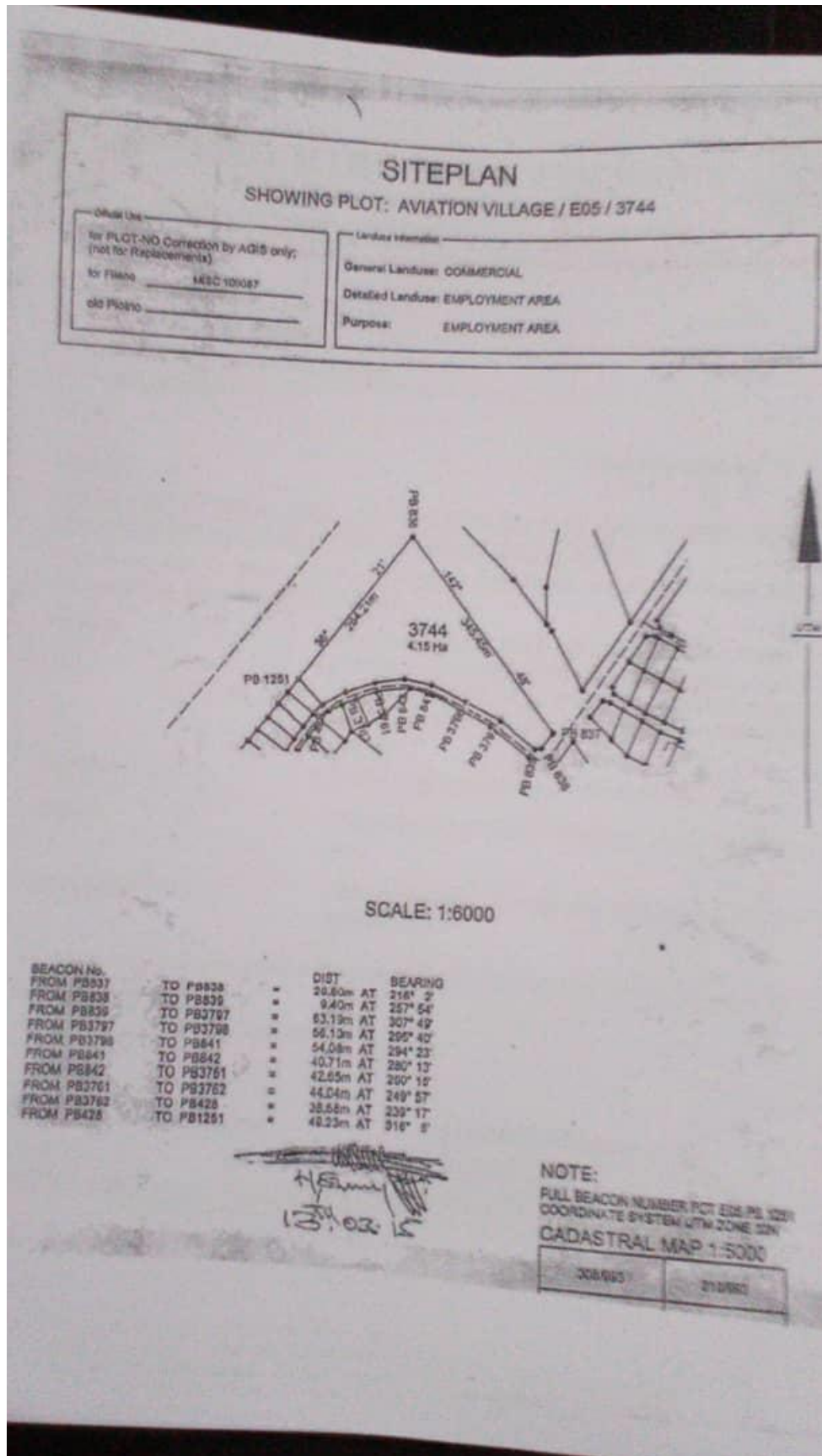
Plate 3.8: Proposed Project Site from the Eastern Axis



**Figure 3.2: Administrative Map of Abuja FCT showing the Abuja Municipal Area Council (AMAC)**



**Figure 3.3:** Satellite Map of Aviation Village Area of Abuja Municipal Area Council Showing the Approximate Location of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT



**Figure 3.4: Survey Map of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

### 3.3 PROJECT ACTIVITIES

#### 3.3.1 Project Components

The entire project will be separated into different components as shown below:

- (i) Site preparation
- (ii) Construction of six (6) tanks with total storage capacity of 3,230.20 m<sup>3</sup>
- (iii) Construction of Ancillary Facilities/Utilities

##### 3.3.1.2 SITE PREPARATION

The site preparation activities shall involve filling the site, soil conditioning and stabilization. This shall also involve preliminary works such as geotechnical surveys for tankfarm installation suitability, excavation, debris disposal, etc.

As there will be need for some form of soil improvement to be carried out on the parcel of land before the adoption of shallow foundation (foundation depth of between 1.50m and 2.00m), raft foundation will be used to stabilize the base foundations of the critical structures, based on findings / recommendations contained in the Geotechnical Investigation Report.

##### 3.3.1.3 CONSTRUCTION OF SIX (6) TANKS WITH TOTAL EFFECTIVE STORAGE CAPACITY OF 3,230.20 M<sup>3</sup>

The main components of the project will involve the construction and installation of six (6) numbers refined product storage tanks with a total / combined storage capacity of 3,230,200 Litres:

- 1.) 1 – Vertical ATK Tank of 2,000 Cubic Metres effective capacity;
- 2.) 2 – Vertical ATK Tanks of 502 Cubic Metres effective capacity each, thereby making a total of 1004 Cubic Metres effective capacity;
- 3.) 3 – Horizontal ATK Tanks of 75.4 Cubic Metres Effective capacity each, thereby making a total of 226.2 Cubic Metres Effective capacity.

See Figures 3.5 to 3.9; and, Tables 3.1 and 3.2 for more information on the tanks and their specification.

**Table 3.1: Applicable Design, Codes and Standards**

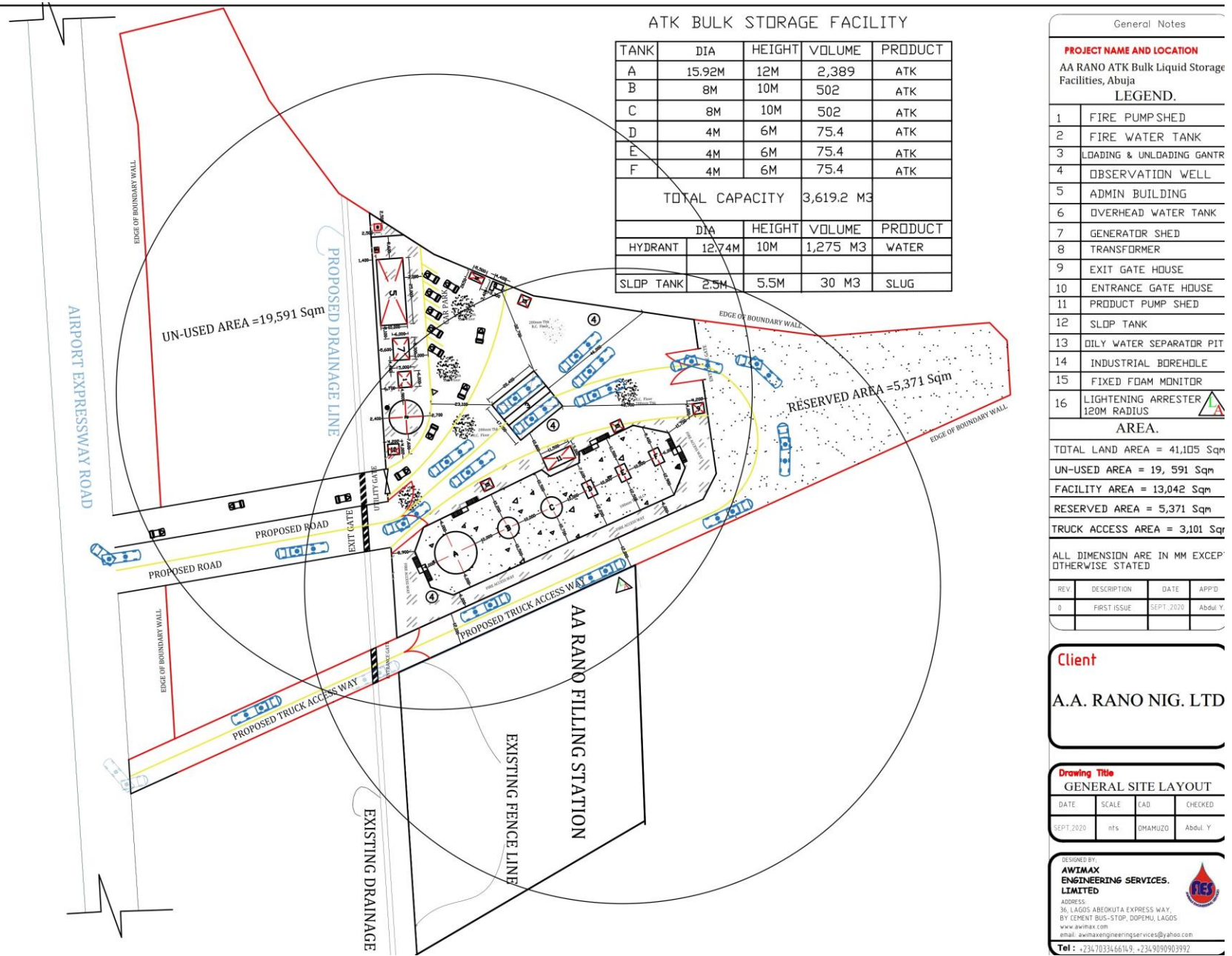
The Aviation Turbine Kerosene (ATK) Depot Facility's design is in conformance with the following International/Local Design, Codes and Standards:

<b>DESIGN, CODES STANDARDS</b>		
1.0	WELDED STEEL TANK	API 650 (LATEST) & ASME SEC IX & V
2.0	BOTTOM PLATE THICKNESS	8mm – 12mm
3.0	COROSION ALLOWANCE	3mm
4.0	DESIGN WIND LOAD	100m/hr
5.0	INTERTANK SPACE (MIN)	10m (API 2610)
6.0	EARTHQUAKE	NOT APPLICABLE
7.0	SAND BLASTING	NACE No. 2/SSPC-SP10
8.0	ELECTRIC CODE	NIGERIA STANDARD
9.0	CONCRETE	BS 8110 Part 1 & BS Part 1,2,3&4
10.0	CARBON STEEL	BS 4449
11.0	FOUNDATION	BS 8004
12.0	EARTH WORKS	CP 2004
13.0	FIRE PROTECTION	NFPA
14.0	PIPING	API 1104
15.0	PLANT BUILDINGS	UNIFIED BUILDING CODE

**Table 3.2: General notes on Figure 3.5**

<b>GENERAL NOTES</b>					
<b>SCHEDULE OF TANKS</b>					
<b>TANK NO.</b>	<b>PRODUCT</b>	<b>SIZE</b>		<b>OPERATING TANK CAPACITY (M<sup>3</sup>)</b>	
		<b>DIA (M)</b>	<b>HT (M)</b>		
A	ATK	15.92	12.0	2,389	1 NO.
B	ATK	8.0	10.0	502	1 NO.
C	ATK	8.0	10.0	502	1 NO.
D	ATK	4.0	6.0	75.4	1 NO.
E	ATK	4.0	6.0	75.4	1 NO.
F	ATK	4.0	6.0	75.4	1 NO.
<b>TOTAL (6 NOS.)</b>				<b>3,619.20</b>	
	SLOP TANK	2.5	5.5	<b>30</b>	1 NO.
	FIRE WATER	1 2.74	10	<b>1,275</b>	1 NO.





**Figure 3.5: General Plot Plan of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

### 3.3.1.5 CONSTRUCTION OF ANCILLARY FACILITIES/UTILITIES

The utilities indicated here include fire fighting, cooling water tanks and piping, lightening prevention devices, generators, monitoring wells and source of potable water, installation of pumps, etc; see Figure 3.5 to 3.10 and 3.15 to 3.24; and also Tables 3.1, 3.2, 3.3 and 3.4.

#### 3.3.1.7 Estimated Labour Requirements:

1.	Civil Works	10-17 persons
2.	Structural Steel Works and Piping	5 persons
3.	Tank Fabrication and Erection	7 persons
4.	Electrical	3 persons
5.	Equipment Installation	4 persons
6.	Fire Fighting Equipment Installation	3 persons
7.	Aluminium Windows, Doors, Partitions and Roofs	3 persons
8.	Auxiliary Works	3 persons

Total Manpower Requirement will range from 38 to 45 persons to be distributed as follows: 30% Skilled; 30% Semi-skilled; and 40% Unskilled.

### 3.4 CONSTRUCTION OF THE TANKS AND ANCILLARY FACILITIES

The project shall include the construction / installation of the following facilities as indicated in the plan layout (see Figure 3.5 and also Tables 3.1 and 3.2).

#### Figure 3.5 - Project Site Layout, has:

#### 1. Six (6) Nos. Fuel Storage Tanks with a total operating capacity of 3,230,200 Litres:

- 1.) 1 – Vertical ATK Tank of 2,000 Cubic Metres effective capacity;
- 2.) 2 – Vertical ATK Tanks of 502 Cubic Metres effective capacity each, thereby making a total of 1004 Cubic Metres effective capacity;
- 3.) 3 – Horizontal ATK Tanks of 75.4 Cubic Metres Effective capacity each, thereby making a total of 226.2 Cubic Metres Effective capacity.

#### 2. Loading Island with capacity for loading four (4) refueller trucks at a time

Figures 3.5 and 3.10, for details.

#### 3. Trucks Parking Lot:

A Trucks Withholding Bay with capacity for 20 Trucks within the proposed depot site, is planned along with the proposed project;

**4. One (1) Slop Tank with capacity of 30,000 Litres:**

Slop tanks are used to separate and recover leaked or spilled oil products from wastewater or storm water gathered from within bund walls, etc.

**5. Three (3) Monitoring Wells:**

These wells are required to monitor the quality of ground water and to observe incase of any seepages or oil pollution arising from the operation of the depot. See Figures 3.5 and also Table 3.4 for details.

**6. Bund Walls (with capacity for 120% of the storage capacity of banded tank):**

The bund walls are to collect any spillage during operations or rupture of refined petroleum products' storage tanks. Besides the above, it gathers storm water around the petroleum products tanks, which is then channeled to the slop tanks for separation using the gravity - floatation process.

**7. An Admin Building, consisting of:**

- i.) Offices;
- ii.) Toilets;
- iii.) Conference Room;
- iv.) Maintenance Office;
- v.) Laboratory, etc.

**8. A Utility Building, consisting of:**

- i.) Utilities Section;
- ii.) Switchgear Room;
- iii.) Control Panels.

**9. Pump House – comprising 4 Nos. Pumps:**

- i.) 3 - Nos. Product Pumps - loading and unloading;
- ii.) 1 - No. Flush Pump;

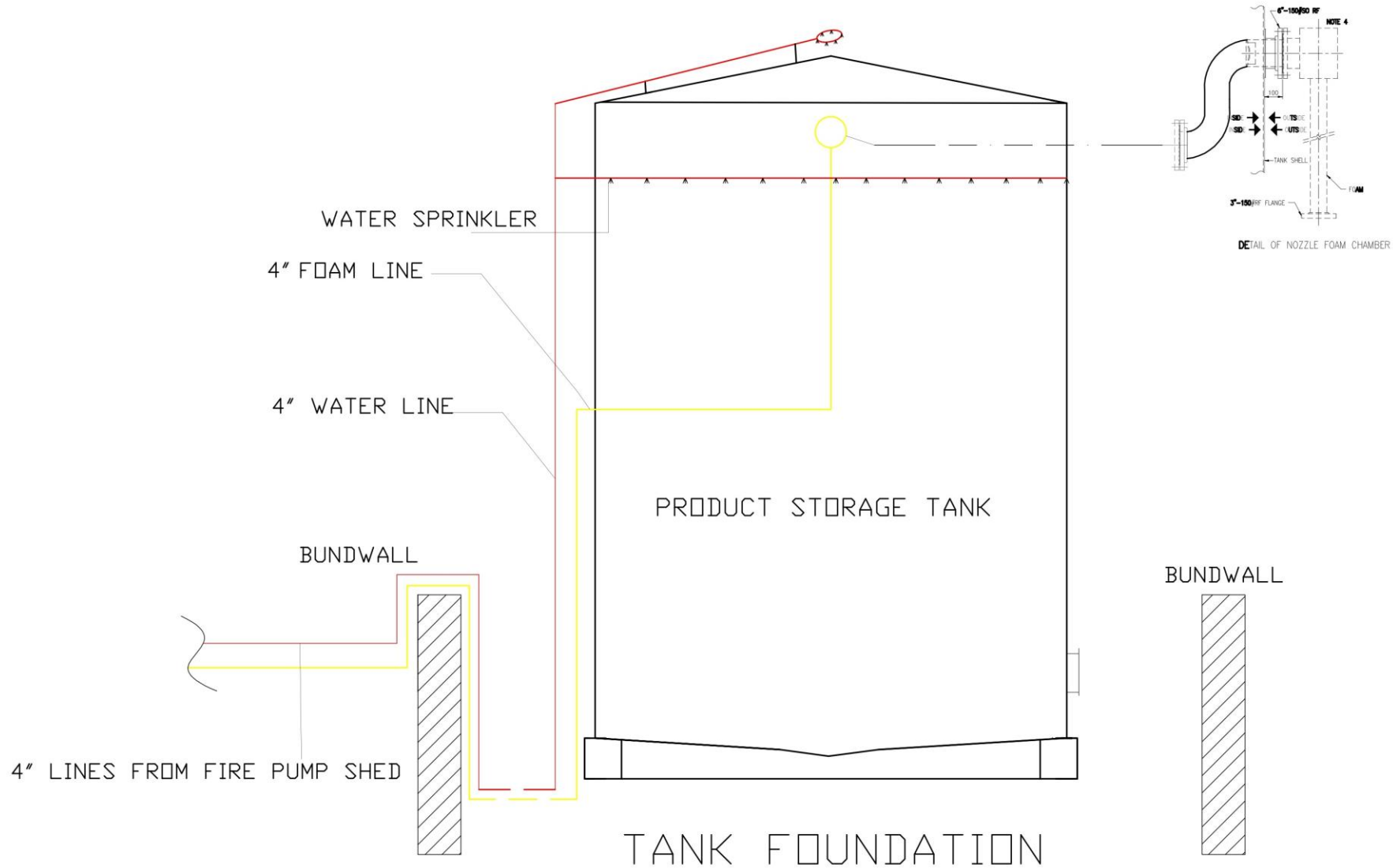
**10. Other Associated Facilities**

See Figure 3.5 for layout.

Other associated facilities that will be provided for the smooth and sustainable operation of the tank farm are:-

- i.) Car park;

- ii.) Security House;
- iii.) Foam Bladder Tank;
- iv.) Generators House;
- v.) Water Treatment Plant;
- vi.) Oil - Water Separator;
- vii.) National Grid Installation - 11,000V medium tension;
- viii.) 650 KVA Transformer;
- ix.) 2 Nos. Electricity Generating Machines;
  - a.) 1 No. 500 KVA;
  - b.) 1 No. 100 KVA.
  
- x.) Fresh Water Storage Tank (1,275,000 litres);  
An industrial borehole shall be sunk and the water from it will be used for fire fighting, cooling of tanks and for other uses;
  
- xi.) Soakaway Tank
  
- xii.) Septic Tank

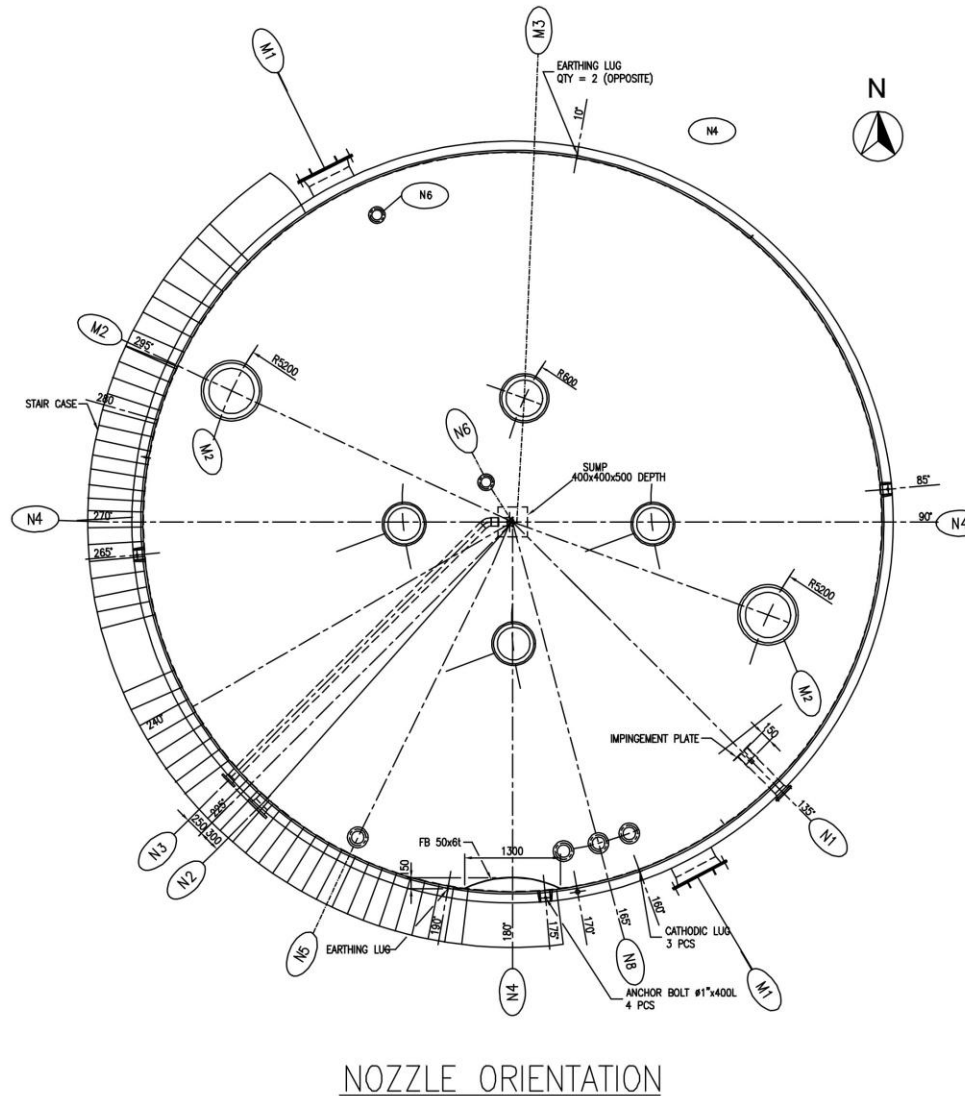


### FOAM/WATER PIPE NETWORK SCHEMATICS FOR PRODUCT TANK

**Figure 3.6: Product Storage Tank Drawing with Foam / Water Piping for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

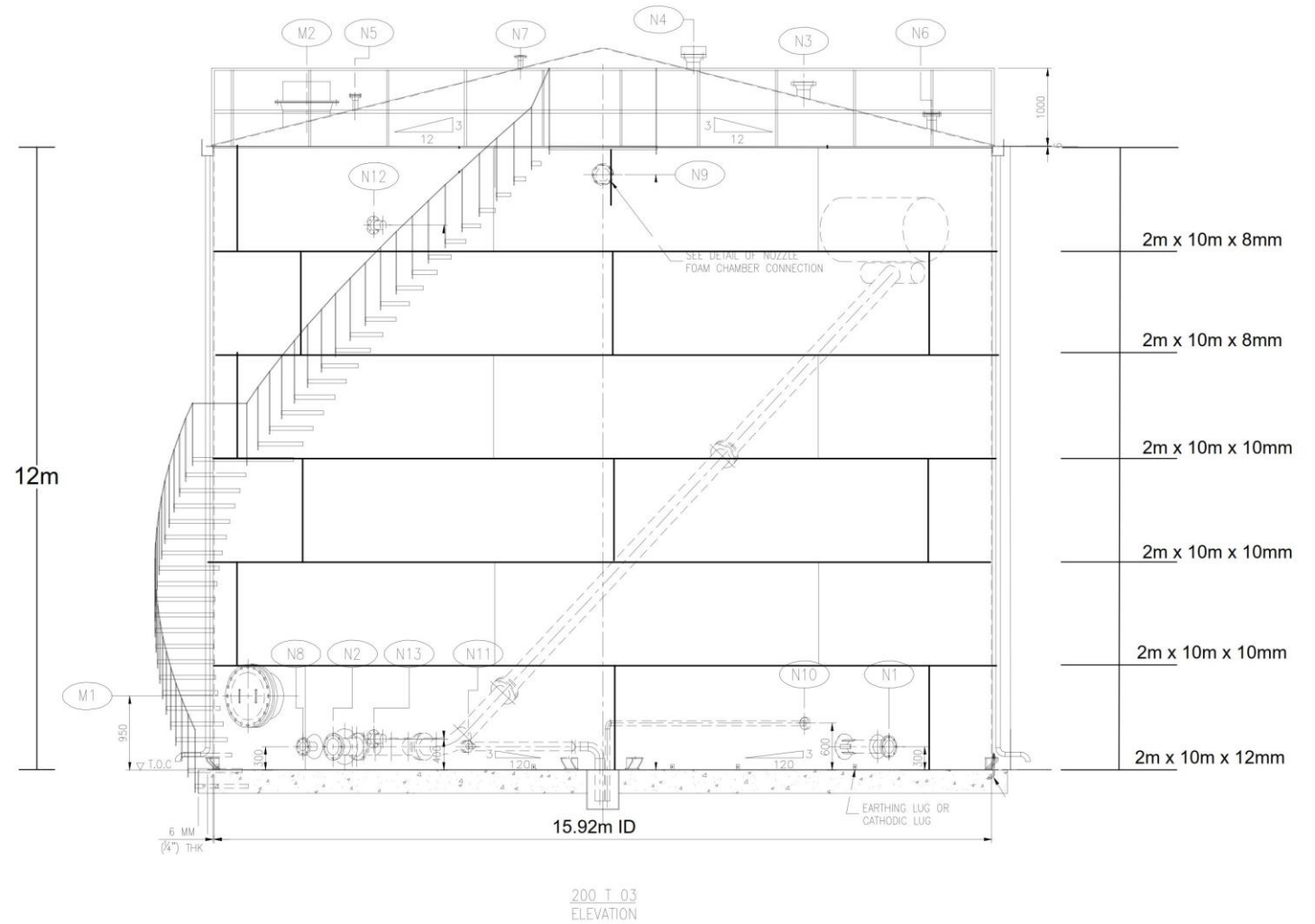
# PRODUCT TANK APPURTENANCE PLAN

ATMOSPHERIC STORAGE TANK DATA			
TAG NUMBER	:		
TYPE OF TANK	: VERTICAL CYLINDER		
SERVICE	: HYDROCARBON		
DESIGN CODE	: API 650		
DESIGN CONDITION			
WORKING CAPACITY	: 476.9 M <sup>3</sup>		
MAXIMUM CAPACITY	: 502 M <sup>3</sup>		
DIAMETER	: 8 M (INSIDE DIAMETER)		
HEIGHT	: 10 M		
ROOF TYPE	: SELF SUPPORTING CONE ROOF		
FILLING RATE	: --		
EMPTYING RATE	: --		
CORROS. ALLOWANCE	: 3 MM (SHELL, BOTTOM)		
JOINT EFFICIENCY	: 0.85		
DESIGN SP. GRAVITY	: 0.81		
DESIGN PRESSURE	: ATM		
DESIGN TEMP	: 120°F		
WIND VELOCITY	: 70 MPH		
MATERIALS			
SHELL PLATE	: PL-1/4" x 6' x 20' (A 36)		
BOTTOM PLATE	: PL-6/16" x 6' x 20' (A 36)		
ROOF PLATE	: PL-6/16" x 6' x 20' (A 36)		
STRUCTURAL	: A36 OR EQ.		
NOZZLE NECK	: A 106 Gr.B		
FLANGE	: A 105		
GASKET	: NON ASBESTOS		
BOLTING	: A 193 Gr.B7 & A 194 2.H		
TANK APPURTENANCES			
SERVICE	QTY	REMARK'S	
EXTERNAL STAIR	1 SET		
HAND RAIL	1 SET		
EARTH LUG & CATHODIC LUG	5 SETS		
ROOF HANDRAIL	1 SET		
SHELL & MANHOLE			
DESCRIPTION	QTY-SIZES	RATING	REMARK'S
INLET	1-8"	N1-200#WN RF	
OUTLET	1-8"	N2-200#WN RF	
DRAIN	1-4"	N3-100#WN RF	
BREATHER VALVE	2-8"	N4-200#WN RF	
DEEP HATCH	1-5"	N5-125#WN RF	
WATER HATCH	1-4"	N6-100#WN RF	
GAUGE HATCH	1-4"	N4-150#WN RF	C/W STANDARD HATCH
SHELL MANHOLE	2-24"	M1-API 1085	C/W BLIND FLANGE
ROOF & MANHOLE			
DESCRIPTION	QTY-SIZES	RATING	REMARK'S
HIGH LVFL/LOW LVFL SWITCH	1-2'x4'6"	N8-200#WN RF	
VENT CONNECTION	1-8"	N7-200#WN RF	
EMERGENCY VENT WITH MANHOLE	1-24"	N3-API 650	
ROOF MANHOLE	2-24"	M2-API 650	C/W BLIND FLANGE

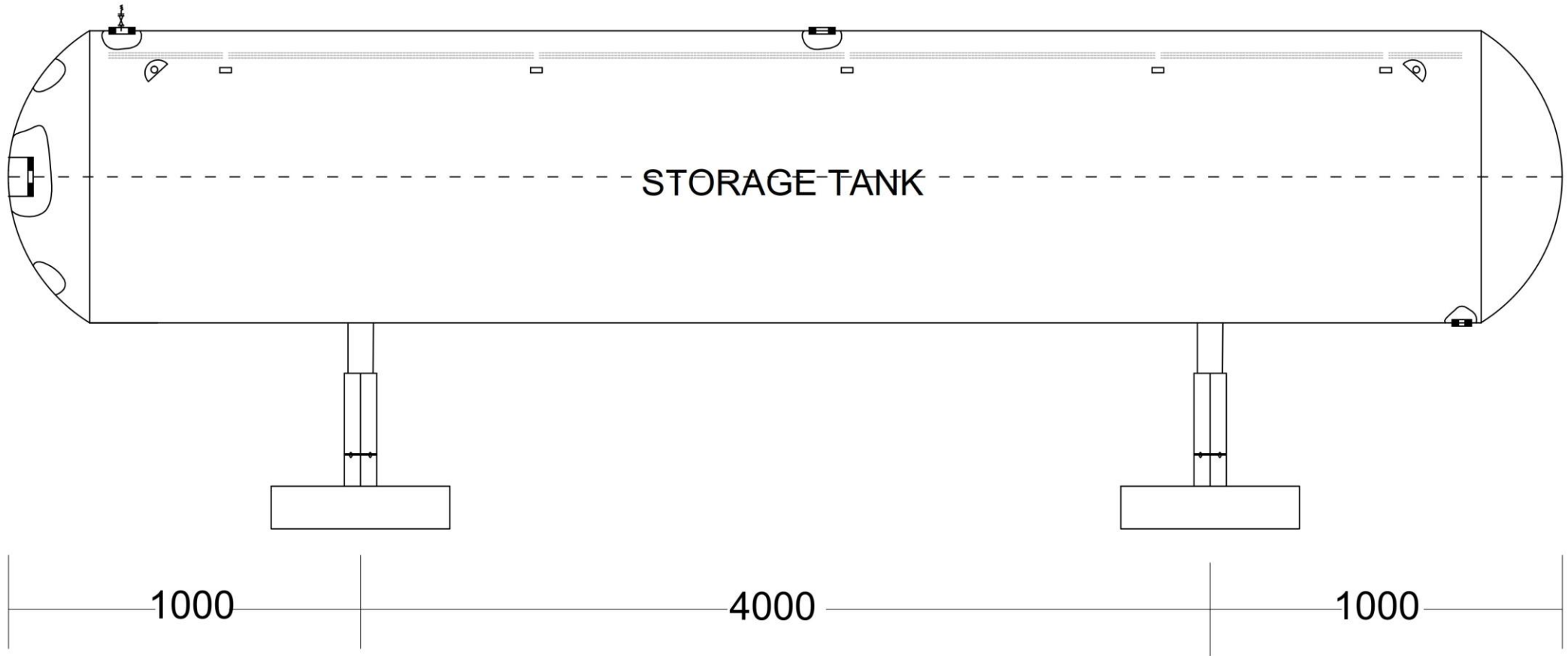


**Figure 3.7: Product Storage Tank Appurtenance Plan Drawing for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

ATMOSPHERIC STORAGE TANK DATA			
TAG NUMBER	:		
TYPE OF TANK	:	VERTICAL CYLINDER	
SERVICE	:	JET A	
DESIGN CODE	:	API 650	
DESIGN CONDITION			
WORKING CAPACITY	:	1199 m <sup>3</sup>	
MAXIMUM CAPACITY	:	2389m <sup>3</sup>	
DIAMETER	:	15.92 m ( INSIDE DIAMETER )	
HEIGHT	:	12m	
ROOF TYPE	:	SELF SUPPORTING CONE ROOF	
FILLING RATE	:	-	
EMPTYING RATE	:	-	
CORROS. ALLOWANCE	:	3 MM ( SHELL, BOTTOM )	
JOINT EFFICIENCY	:	0,85	
DESIGN SP. GRAVITY	:	0,81	
DESIGN PRESSURE	:	ATM	
DESIGN TEMP	:	120°F	
WIND VELOCITY	:	70 MPH	
MATERIALS			
SHELL PLATE	:	PL1/4" x 6' x 20' ( A 36 )	
BOTTOM PLATE	:	PL6/16" x 6' x 20' ( A 36 )	
ROOF PLATE	:	PL6/16" x 6' x 20' ( A 36 )	
STRUCTURAL	:	A36 OR EQ.	
NOZZLE NECK	:	A 106 Gr.B	
FLANGE	:	A 105	
GASKET	:	NON ASBESTOS	
BOLTING	:	A 193 Gr.B7 & A 194 2.H	
TANK APPURTENANCES			
SERVICE		QTY	REMARK'S
EXTERNAL STAIR		1 SET	
HAND RAIL		1 SET	
EARTH LUG & CATHODIC LUG		5 SETS	
ROOF HANDRAIL		1 SET	
SHELL & MANHOLE			
DESCRIPTION	QTY-SIZES	RATING	REMARK'S
INLET	1-6"	N1-150#WN RF	
OUTLET (FLOATING SUCTION)	1-8"	N2-150#WN RF	
DRAIN	1-4"	N8-150#WN RF	
FOAM CHAMBER CONNECTION	1-6"	N9-150#50 RF	
FLUSH CONNECTION	1-2"	N10-150#WN RF	
SPARE/QUALITY SAMPLE	1-2"	N11-150#WN RF	C/W BLIND FLANGE
HIGH LEVEL/LOW LEVEL SWITCH	1-4"	N12/N13-150#WN RF	
SHELL MANHOLE	1-24"	M1-API 650	C/W BLIND FLANGE
ROOF & MANHOLE			
DESCRIPTION	QTY-SIZES	RATING	REMARK'S
LEVEL TRANSMITTER	1-6"	N3-150#WN RF	
GAUGE HATCH	1-6"	N4-150#WN RF	C/W STANDARD HATCH
SPARE	1-2"	N5-150#WN RF	C/W BLIND FLANGE
TEMPERATURE TRANSMITTER	1-4"	N6-150#WN RF	
VENT CONNECTION	1-2"	N7-150#WN RF	
EMERGENCY VENT WITH MANHOLE	1-24"	M2-API 650	

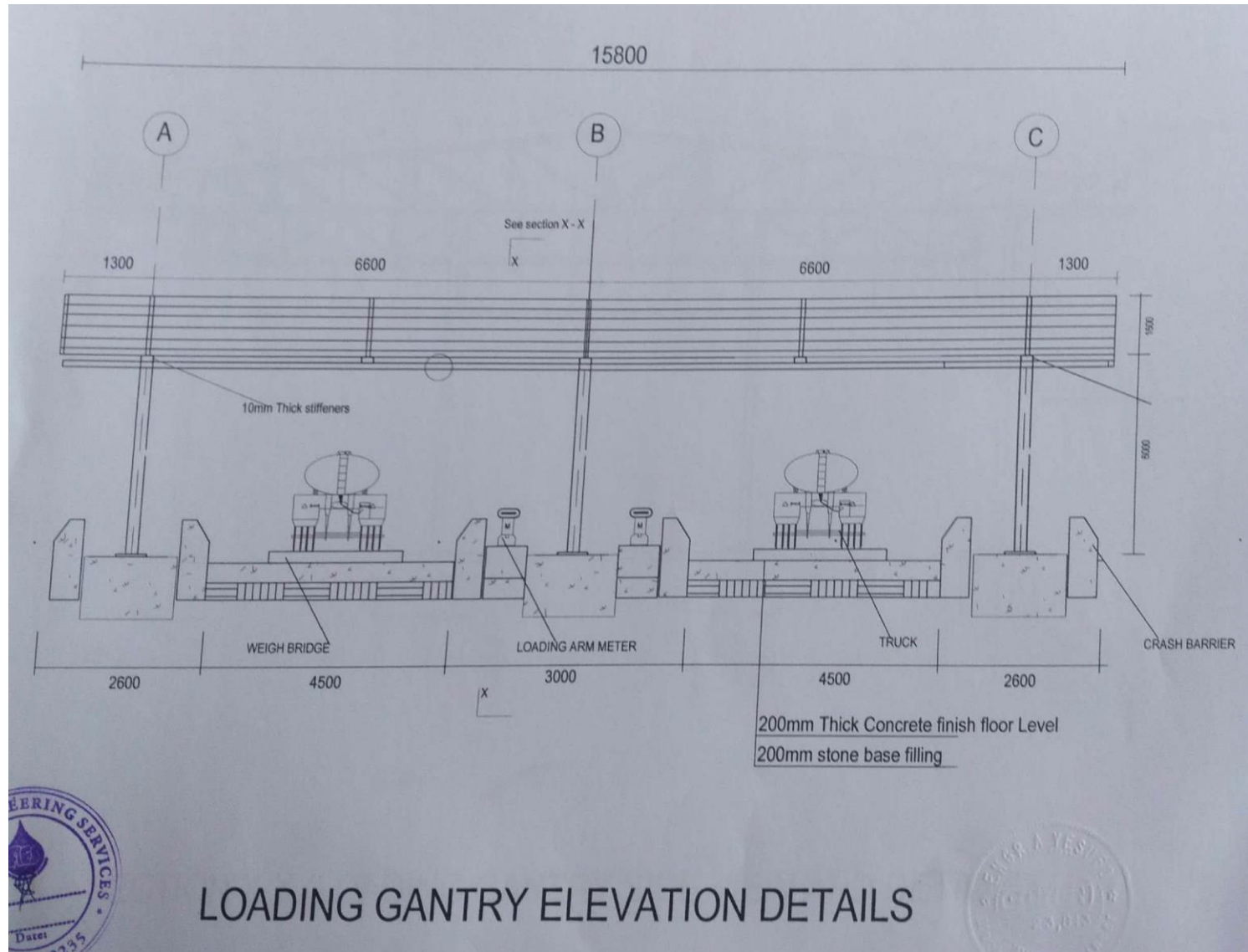


**Figure 3.8: Storage Tank Drawing for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, showing Vertical Tank Elevation**



**Figure 3.9: Storage Tank Drawing for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, showing Horizontal Tank Orientation**





**Figure 3.10: Loading Gantry Elevation Details for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

### **3.5 FACILITY OPERATIONS.**

#### **3.5.1 Products Supply**

The main activities to be carried out through the project are: -

1. Receiving of Petroleum Products (ATK) from refineries/through import by vessels; and transporting the Aviation Turbine Kerosene (ATK) to A. A. Rano Limited's Depot at Aviation Village, along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja.
2. Storage of Aviation Turbine Kerosene (ATK) - Jet Oil in the depot tanks.
3. Loading and delivery of the above stated product to refueller trucks for transport to the airport for aircrafts' fueling.

The facility will be supplied with Aviation Turbine Kerosene (ATK) - Jet Oil from refineries from within and outside the country via sea-going vessels / barges and then transported to the proposed A. A. Rano Nigeria Limited's ATK depot along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja, using Tank Trucks.

#### **3.5.2 Products Loading**

##### **3.5.2i Receiving, Storing, and Loading of Aviation Turbine Kerosene (ATK) – Jet Oil**

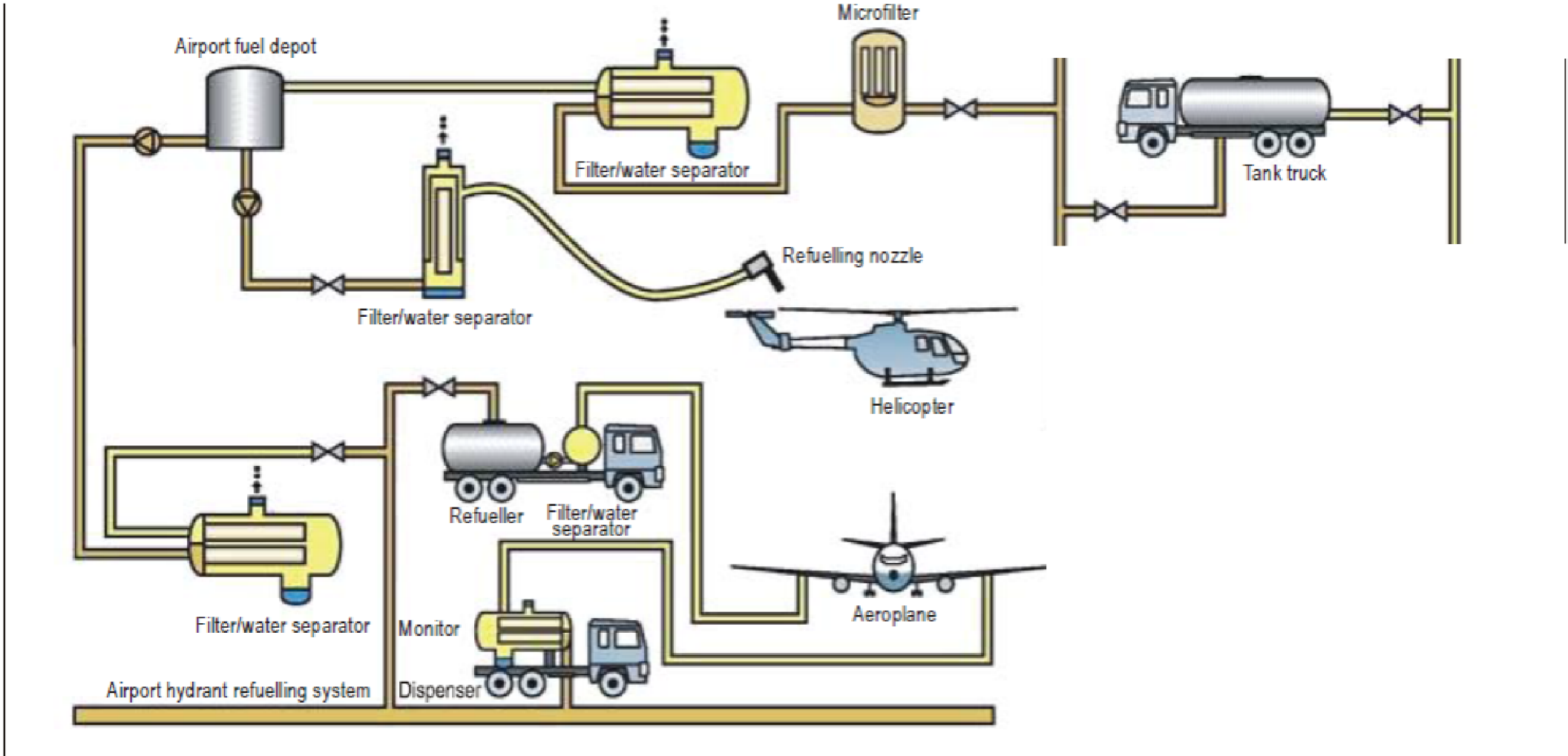


Figure 3.11: General Process Flow Diagram

AVIATION FUEL TANK  
 PRESS: (DES./VAC.): 172/6mbarg  
 TEMP: (OP./DES.): 30/40 C

LEGEND.

8" & 6" PRODUCT LINE

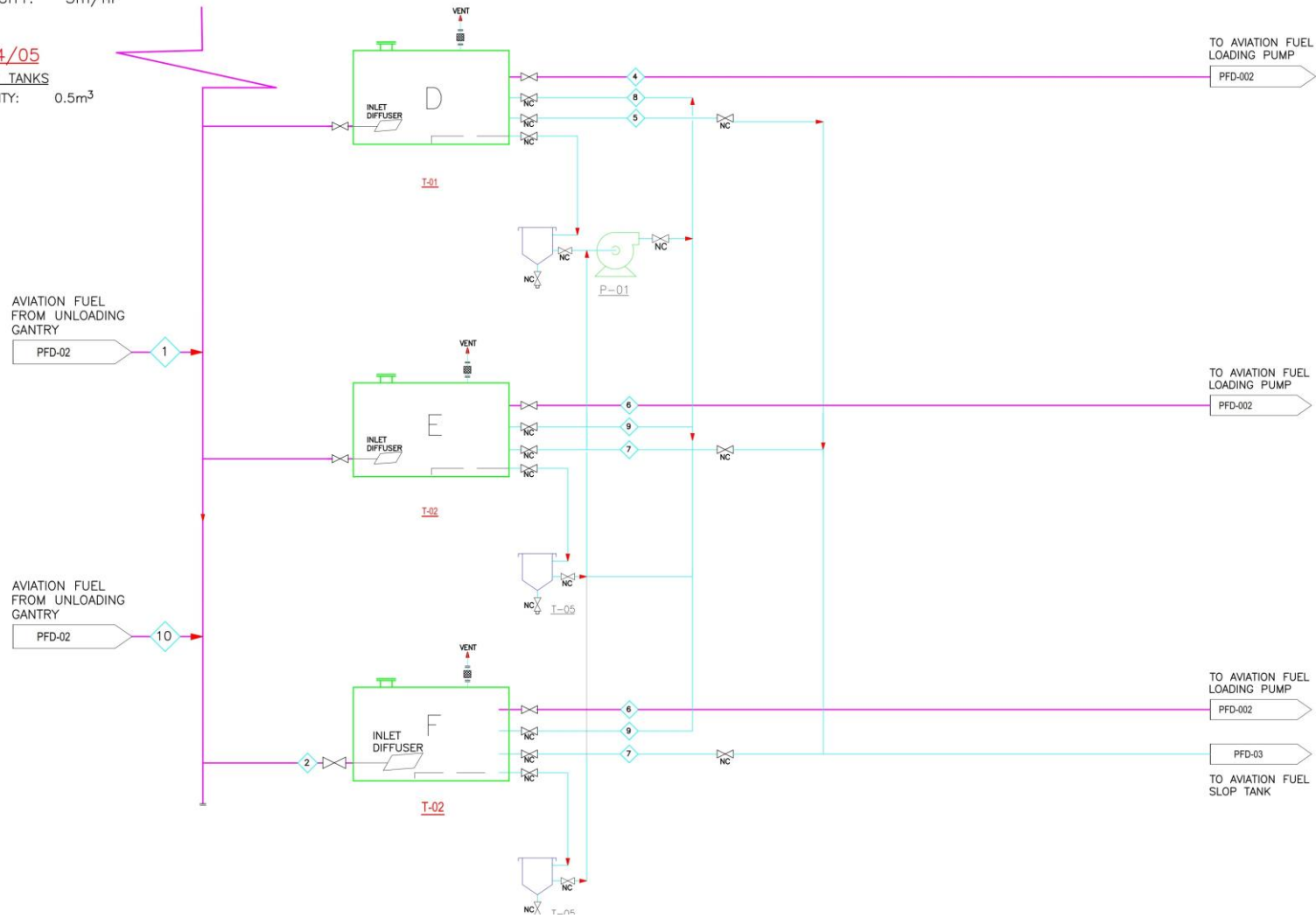
2" PRODUCT LINE

P-01

FLUSH TANK PUMP  
 CAPACITY: 3m<sup>3</sup>/hr

T-04/05

FLUSH TANKS  
 CAPACITY: 0.5m<sup>3</sup>



**Figure 3.12: Process Flow Diagram for Horizontal ATK Tanks for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

AVIATION FUEL TANK  
 PRESS: (DES./VAC.): 172/6mbarg  
 TEMP: (OP./DES.): 30/40 C

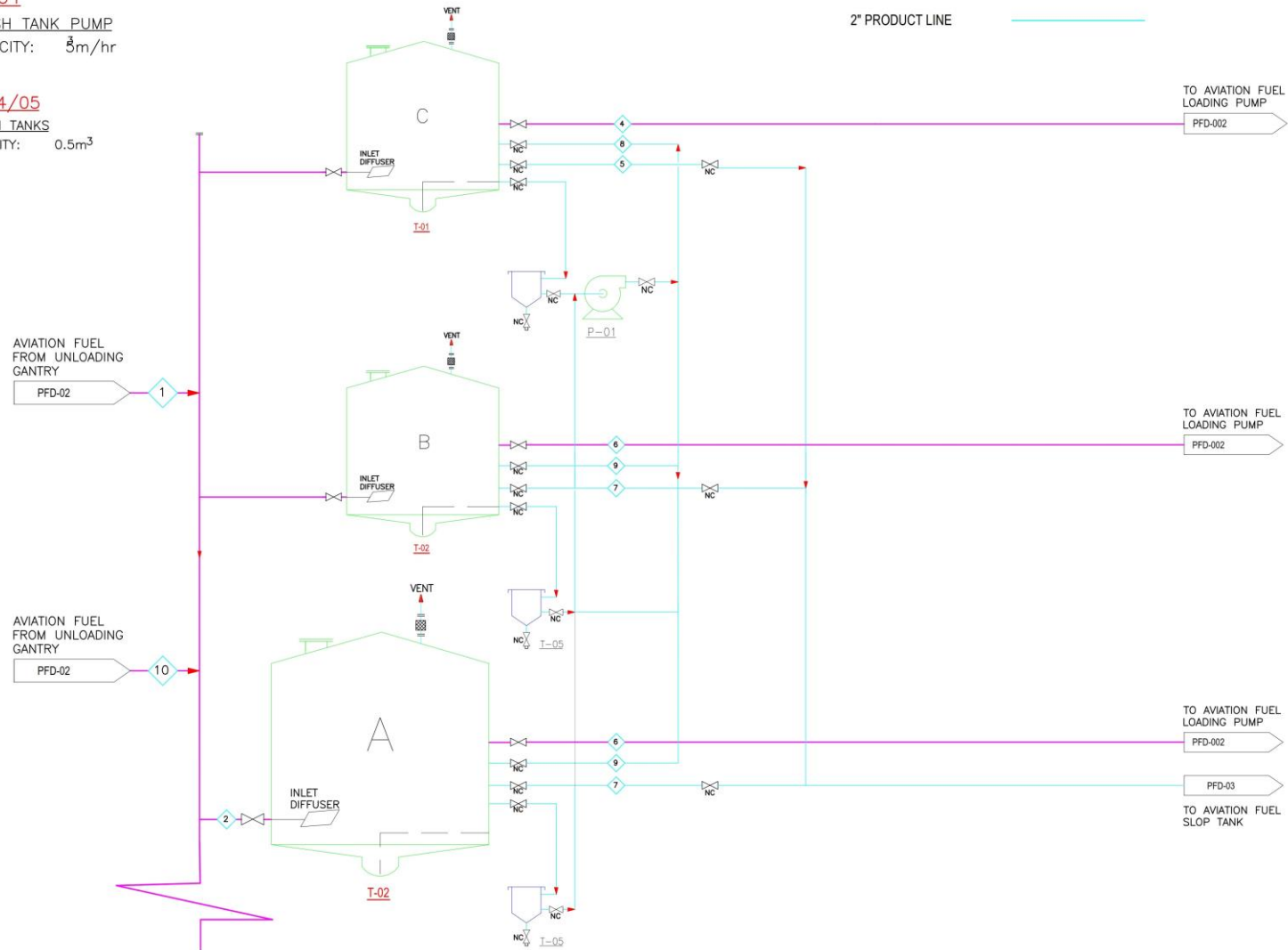
**P-01**  
 FLUSH TANK PUMP  
 CAPACITY: 5m<sup>3</sup>/hr

**T-04/05**  
 FLUSH TANKS  
 CAPACITY: 0.5m<sup>3</sup>

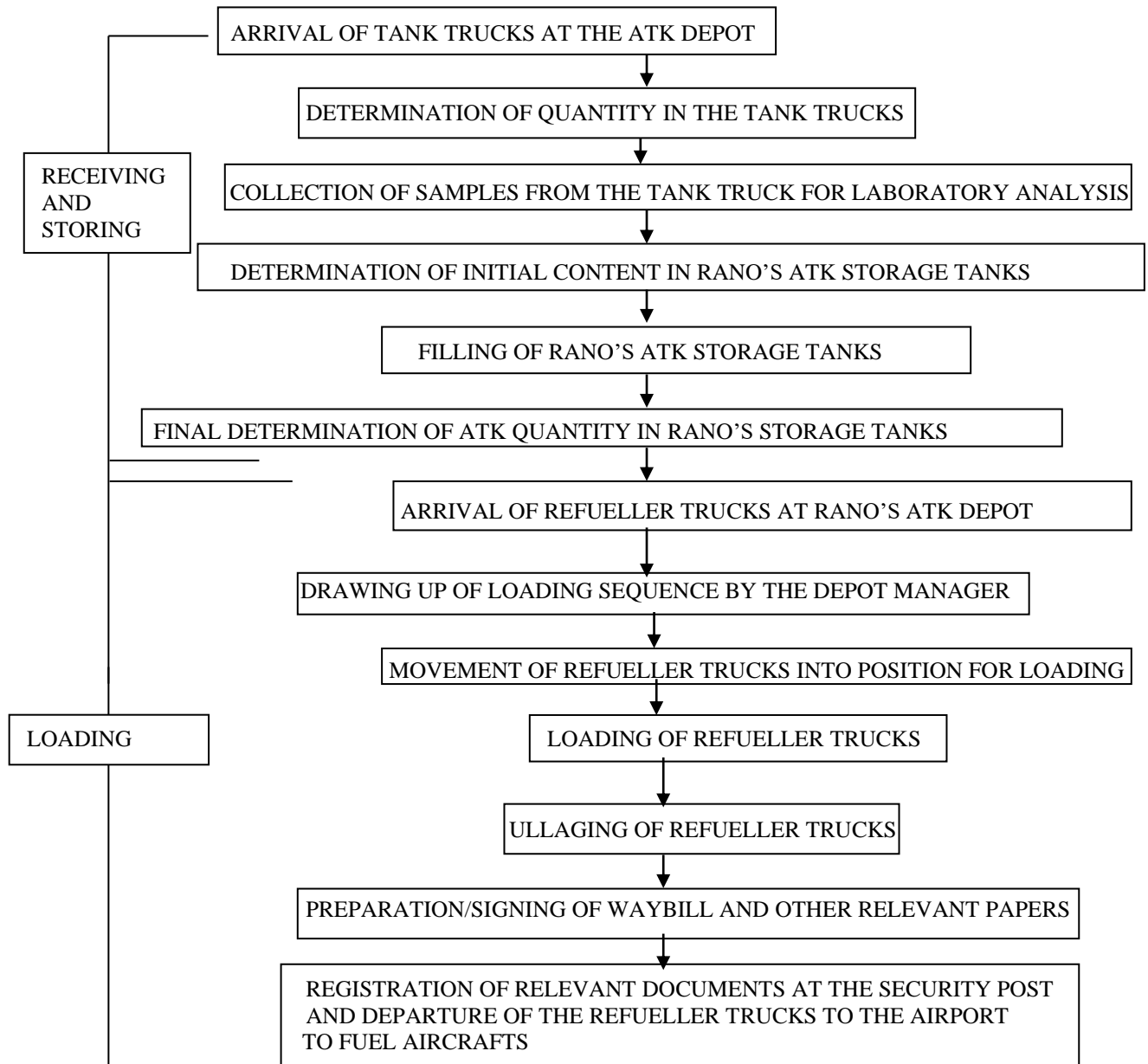
LEGEND.

8" & 6" PRODUCT LINE

2" PRODUCT LINE



**Figure 3.13: Process Flow Diagram for Vertical ATK Tanks for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



**Figure 3.14: Process Flow Chart (Detailed) - ATK**

### 3.5.2ii PROCESS DESCRIPTION (ATK) (See Figures 3.11 and 3.14)

When a Tank Truck arrives the Depot (Proposed A. A. Rano Nigeria Limited's ATK depot along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja) from the Petroleum Products Terminal, it will be parked at the Hard Standing Area within the depot and earthed;

The Relevant Officers will dip the tank to determine the quantity of product being brought and also the amount of water involved;

Thereafter, samples of the products will be taken for Laboratory analyses (where the Specific Gravity (API Gravity) and Temperature are determined) so as to assess its conformity with acceptable standards.

Following a satisfactory result after the laboratory tests, the depot's storage tanks will be prepared for the reception of the product.

**All of the above activities will usually take place prior to the products' reception into the ATK Storage Depot.**

A Technical Service Inspection (TSI) member will dip A. A. Rano's Storage Tanks in association with its representatives both before and after the receipt of the product so as to determine the quantity received.

The filling of the respective storage tanks within A. A. Rano's depot will be done from the Hard Standing Area within the depot (Proposed A. A. Rano Nigeria Limited's ATK depot along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja) through the laid pipes from the respective Storage Tanks.

**The loading of the products into Refueller Trucks at the proposed A. A. Rano Nigeria Limited's ATK Depot will however involve:**

1. Parking of Refueller Trucks, notification of arrival / registration of intention to lift product, by the refueller drivers;
2. Approval of loading and assignment of loading turns to the refueller drivers;
3. Calling of refueller drivers in, for loading in turns and checking of refueller truck calibration by the loader (s) following the signing of relevant papers;
4. Moving of refueller truck into appropriate position on the loading platform and then putting off the truck engine;
5. Earthing of the refueller truck and switching on the explosion arresting system;
6. Loading of the refueller truck with the desired product volume;
7. Dipping of the refueller tank to determine fuel volume loaded;
8. Parking, pending the preparation and signing of waybills and other relevant papers;
9. Driving of the loaded truck outside of the A. A. Rano Nigeria Limited's Fuel Depot, towards the airport for the fueling of aircrafts.

The planned average number of refueller trucks to be loaded with the products per day at the proposed A. A. Rano Nigeria Limited's ATK Depot is about 10 to 20 refueller trucks.

The Planned operational period at the Loading Bay is 8.00am to 6.00pm, though the proposed facility is to have modern illumination gadgets for night loading.

The Proposed Aviation Turbine Kerosene (ATK) Depot Facility will have 3 Nos. main pipeline sizes. These are:

1. 6 inches (150 millimetres) diameter pipeline for floating suction (40 metres length);
2. 4 inches (100 millimetres) diameter pipeline for reception (200 metres length);
3. 2 inches (50 millimetres) diameter pipeline for dispensing (100 metres length);

### 3.5.3 TRAFFIC MANAGEMENT

A Trucks Withholding Bay to hold about twenty (20) trucks within the proposed Aviation Turbine Kerosene (ATK) Depot Facility site, is planned along with the proposed project;

The traffic plan is such that new set of trucks will be allowed to come down to the depot only when there is space for them to load.

### 3.5.4 REDUNDANCY AND FACILITY AVAILABILITY

The facility is designed to operate 24 hours a day, 7 days a week, with one week per year allowed for planned maintenance or 98% availability.

All critical equipment are designed to have one unit in operation and one on standby with the exception of the product transfer pump.

The piping system is designed so that pumps can take suction from different storage tanks to provide the necessary redundancy.

Non-Return Control Valves are designed with double block and bypass so that the facility can be operated manually when maintenance is required on the control valves.

Instrumentation and control valves at individual loading bays will not have redundancy, as the facility would be able to operate at optimum capacity without one of the loading arms.

Maintenance and statutory inspections of the storage tanks will be performed during the planned maintenance.

Firewater system is designed with two main pumps and a single jockey pump. One pump will be required in the event of fire. The second pump is being provided as backup.



## 3.6 SAFETY ISSUES AND PROVISIONS

### 3.6.1 Safety Plans

To work in line with the General Environmental and Safety procedures as contained in Department of Petroleum Resources (DPR) and Federal Ministry of Environment (FMEnv) guidelines and also industry best practice and ensuring compliance by all contractors to acceptable safety standards regulating this trade. The safety issues considered are as stated below.

#### 3.6.1.1 Fire Prevention and Protection Philosophy

A 1,275,000 litres firewater tank, to be supplied from an industrial borehole, will be provided on site with sufficient capacity for sustaining the firewater spray system and tank foam pouring for at least 30 minutes required by Fire Service, based on top of a foam tank - pouring system. The firewater spray system will be applied to vertical surfaces of tanks as fire protection.

The minimum application rate of foam to the tank is 12.2 l/min m<sup>2</sup> and to the bund 4.1 l/min m<sup>2</sup>.

#### 3.6.1.2 Pipeline Safety

The filling of the respective storage tanks within A. A. Rano's depot will be done from the Hard Standing Area within the depot (Proposed A. A. Rano Nigeria Limited's ATK depot along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja) through the laid pipes from the respective Storage Tanks; see Figures 3.15, 3.16 and 3.19.

The Proposed Aviation Turbine Kerosene (ATK) Depot Facility will have 3 Nos. main pipeline sizes. These are:

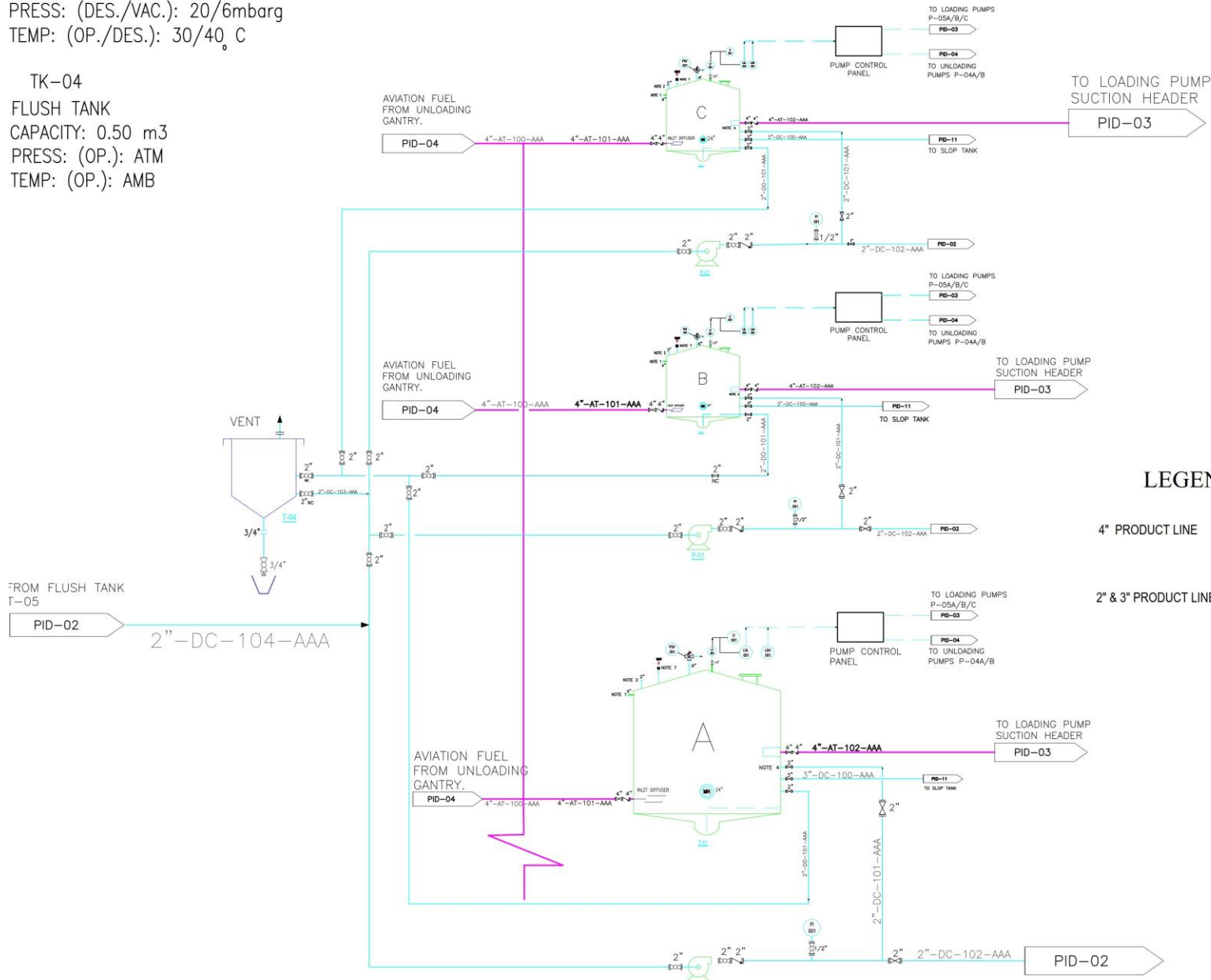
1. 6 inches (150 millimetres) diameter pipeline for floating suction (40 metres length);
2. 4 inches (100 millimetres) diameter pipeline for reception (200 metres length);
3. 2 inches (50 millimetres) diameter pipeline for dispensing (100 metres length);

These pipes will be laid at a depth of 0.8 - 1m to avoid any pressure on them by trucks or heavy equipment.

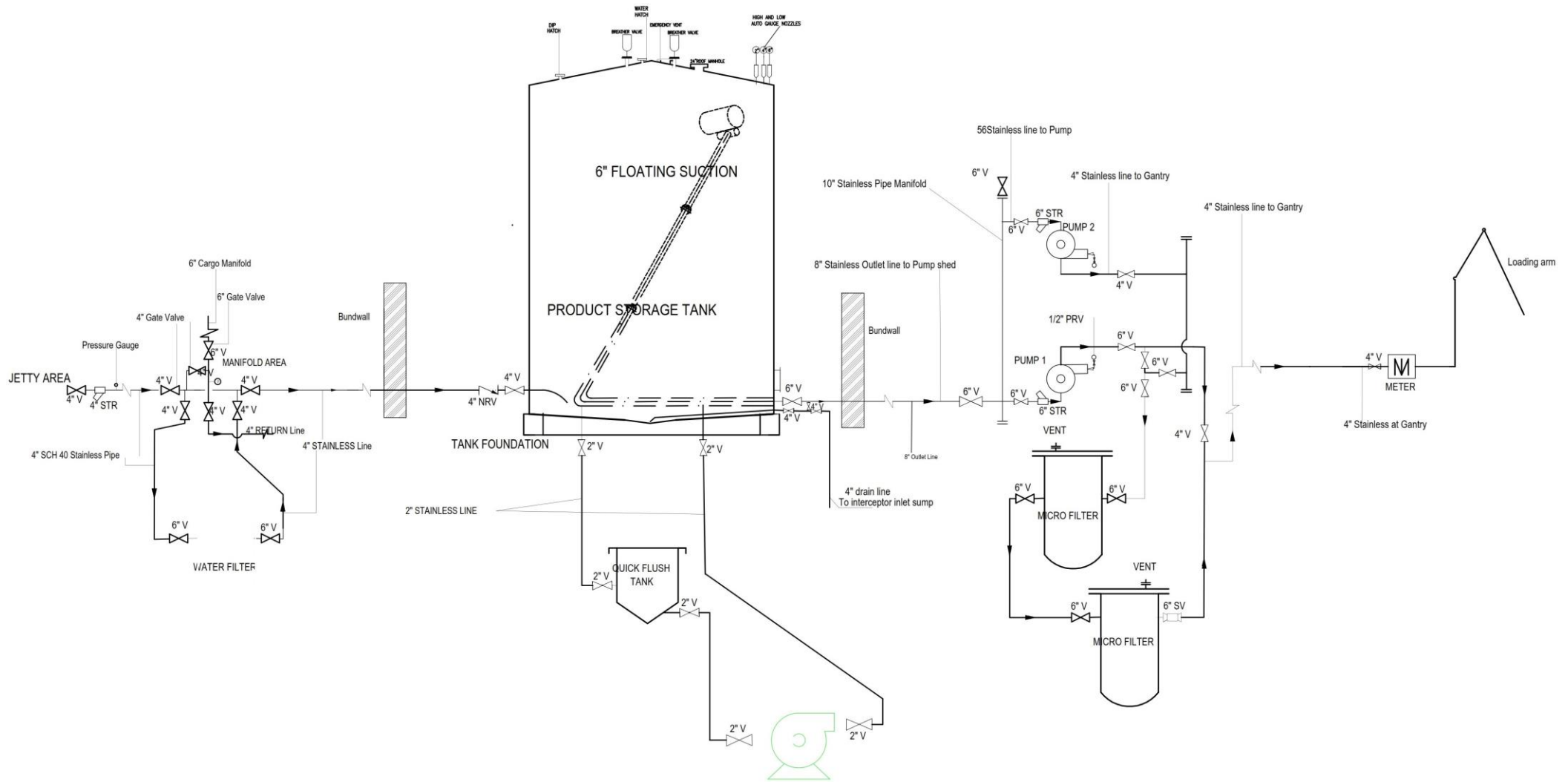
To prevent corrosion, the pipes will be coated with paints which have anti-corrosion materials e.g. Epoxy. SCADA will be employed for safety reasons too.

AVIATION FUEL RECEIPT TANK  
 PRESS: (DES./VAC.): 20/6mbarg  
 TEMP: (OP./DES.): 30/40<sub>o</sub> C

TK-04  
 FLUSH TANK  
 CAPACITY: 0.50 m<sup>3</sup>  
 PRESS: (OP.): ATM  
 TEMP: (OP.): AMB



**Figure 3.15: Piping and Instrumentation Drawing (Schematic) of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



## ATK PIPING & INSTRUMENTATION DRAWINGS

**Figure 3.16:** Piping and Instrumentation Drawings for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT

### 3.7.0 OTHER SAFETY ISSUES AND PROVISIONS

Due to the nature of activities to be carried on through the project, the anticipated occurrence of the following (though rare) is possible:

- (i.) Noise;
- (ii.) Lightning;
- (iii.) Fire/Explosion, and
- (iv.) Oil spillage, the following have been provided/planned with the project.

#### 3.7.1 Sound Proofing for the Generators

To guide against noise levels within the project site being above FMEnv/DPR/LASEPA limits as could occur through the use of generators during power outages from Abuja Electricity Distribution Company (AEDC). All the Electricity Generating Machine being specified for the project will be sound-proofed

#### 3.7.2 Lightning Prevention Device

Units of this device will form part of the installations on the new project site. The devices will protect the entire project installation against damage from lightning.

#### 3.7.3 Fire Prevention/Fighting System (Figures 3.6, 3.17, 3.18, 3.20 and 3.23)

As the products are combustible liquids, extreme fire hazards exist in the event of a tank rupture; or as a result of ignition from lightning, static charges or increased temperature within tanks.

Automatic fire prevention systems incorporating foam pourers and water extinguishing systems are planned basic provisions of the project. Other planned provisions are fire-retarding clothing for operators working directly around the tanks.

Planned along with the project also, is the installation of comprehensive fire prevention and fighting system incorporating the following:

- (a) Prevention/Detection System;
- (b) Water Pump Station;
- (c) Foam System;
- (d) Tank Cooling System;
- (e) Fire Appliance/Truck.

The entire systems stated above (in (a) to (d)) will be connected to a Control Panel in the Utilities Building.

In addition to the above stated planned provisions, there will be one big Fire Alarm and Fire siren connected to the whole facility, including Smoke Detectors in all offices and generator/electrical rooms.

There will be Foam Monitors and Water Hydrant Points (each to be located at strategic positions) round the entire facility.

### **3.7.3(a)i Prevention System**

3.7.3(a)i/1 This involves basic checks, techniques/procedures to ensure the possible occurrence of fire incidence is negated or otherwise brought to the barest minimum.

This programme comprises the following:

- i.) Engagement and training (regularly) of Firemen;
- ii.) Undertaking regular fire drills;
- iii.) General awareness creation/training of all staff on causes of fire, its prevention and mode of extinguishing it;
- iv.) Ensuring that all vehicles entering the depot have Spark / Flame Arrestors installed on their Exhaust Outlet;
- v.) Ensuring that only properly earthed Trucks are allowed to enter the depot for loading with products.

### **3.7.3(a)ii Detection System:**

3.7.3(a)ii/1 This consists of:

- i.) Heat Detectors located on tank roofs;
- ii.) Flame Detectors located at the API Separator (Oil – Water Separator), Haulage Area and Pump Shed;
- iii.) Heat Sensitive Cables within the Loading Bay.

3.7.3(a)ii/2 In the event of a fire incidence, these detectors send signals to the control panel, following which the station activates the Deluge Valve of the concerned area. The deluge valve automatically switches on the foam and water pumps thereby permitting them to mix, thus forming foam/water solution that pass through the deluge valve, nozzles, branch pipes and monitors, and into the concerned area thus putting off the fire.

### **3.7.3(b) Pump Station:**

3.7.3(b)/1 The Station will have the following:

- i.) Main pump for delivering water with a diesel pump as reserve;
- ii.) Foam pump for foam concentrate;
- iii.) Jockey pump to maintain constant pressure in the hydrant circuit;
- iv.) Foam concentrate tank.

### 3.7.3 (c) Foam System:

3.7.3(c)/1 This consists of:

- i.) Deluge Valves
- ii.) Branch –pipes;
- iii.) Nozzles;
- iv.) Foam Monitors;

3.7.3(c)/2 The deluge valves will be arranged in zones to protect designated areas. Such designated areas include:

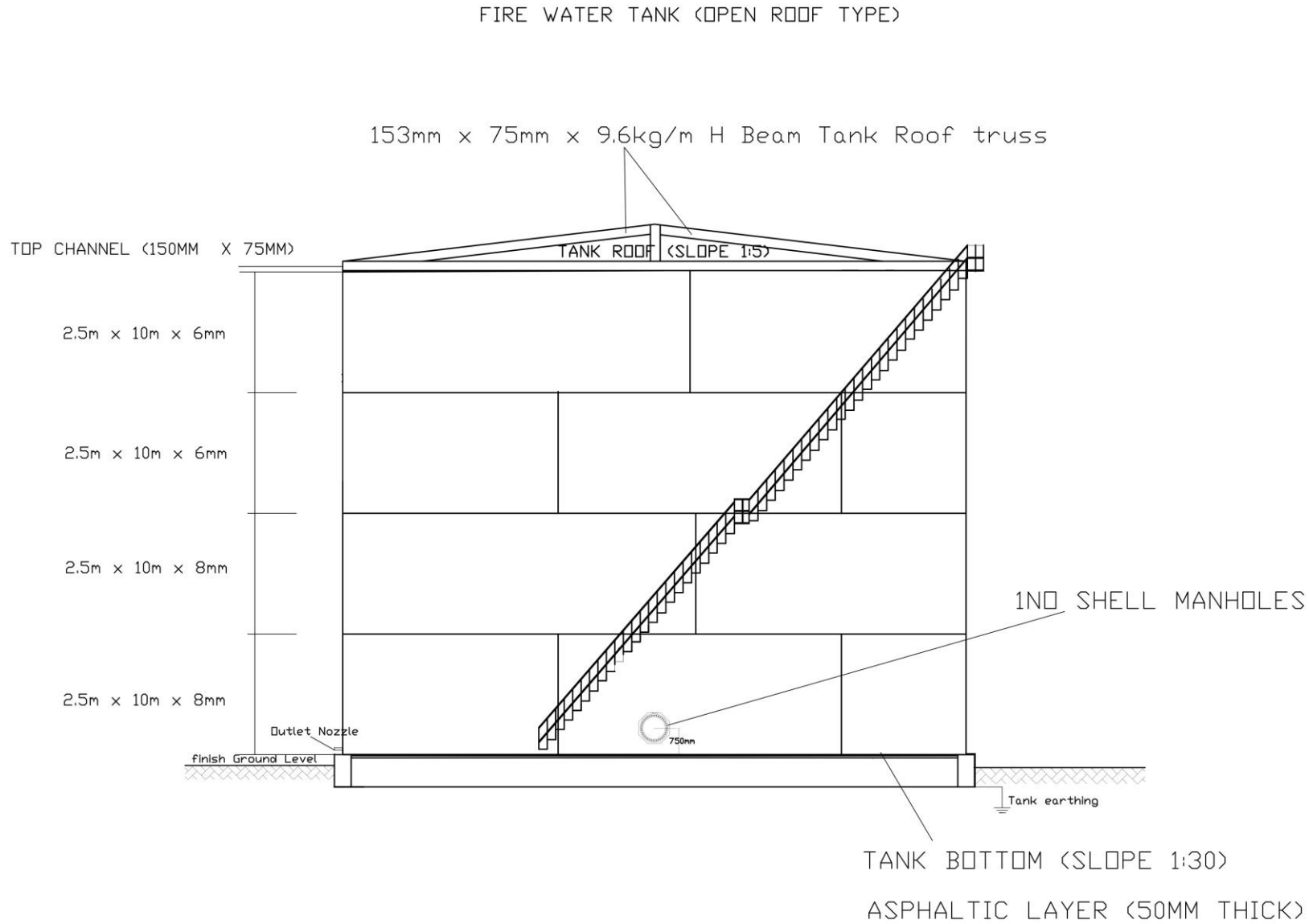
- i.) Tank Area;
- ii.) Pump Shed;
- iii.) Haulage Area;
- iv.) Oil-Water Separator (OWS);
- v.) Loading Bay.

### 3.7.3(d) Tank Cooling System

Each of the six (6) tanks will be protected by a ring of water nozzles that cool the surface areas of the tanks (see Figures 3.6 and 3.17). The system will operate when the roof detectors signal an increase in temperature above a preset level to the control panel.

From the borehole, water will be pumped into an overhead tank of 1,275,000 litres capacity. This will be used for the cooling process. The return water from this cooling process will be discharged to the Oil-Water Separator where oil and water will be separated before being finally discharged.

To guide against erosion and flooding, as the proposed project site is prone to flooding, the landscape and drainage designs are such that all waters (including storm water during rainfall) that fall on or within the facility premises will first be diverted towards a central collection point from where they will be pumped into the Oil-Water Separator and thereafter flow out into the adjoining canal after analyses to ensure compliance with set limits.



General Notes

**PROJECT NAME AND LOCATION**

AA RANO Aviation Storage Terminal


All measurements are in m except otherwise stated

**LEGEND**

Dia. = 12.74m  
 H = 10m  
 V = 1,2752m<sup>3</sup>  
 cir. = 40m

REV	DESCRIPTION	DATE	APP'D
0	FIRST ISSUE	SEPT, 2020	Abdul Y

**Client**

  
**A.A. RANO NIG. LTD.**

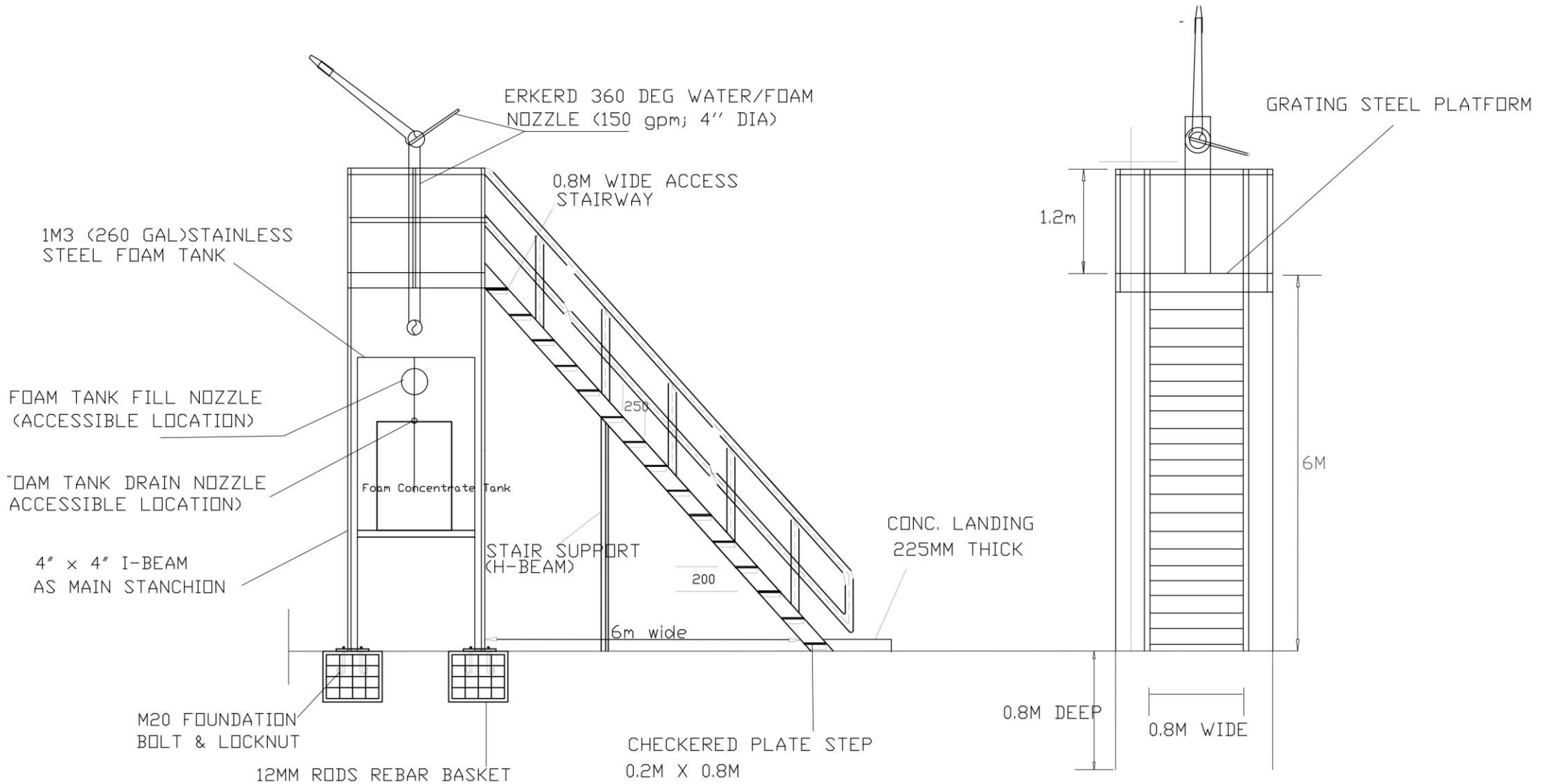
**Drawing Title**

**WATER TANK**

DATE	SCALE	DWG	CHECKED
SEPT, 2020	nts	GMAMUZO	Abdul Y

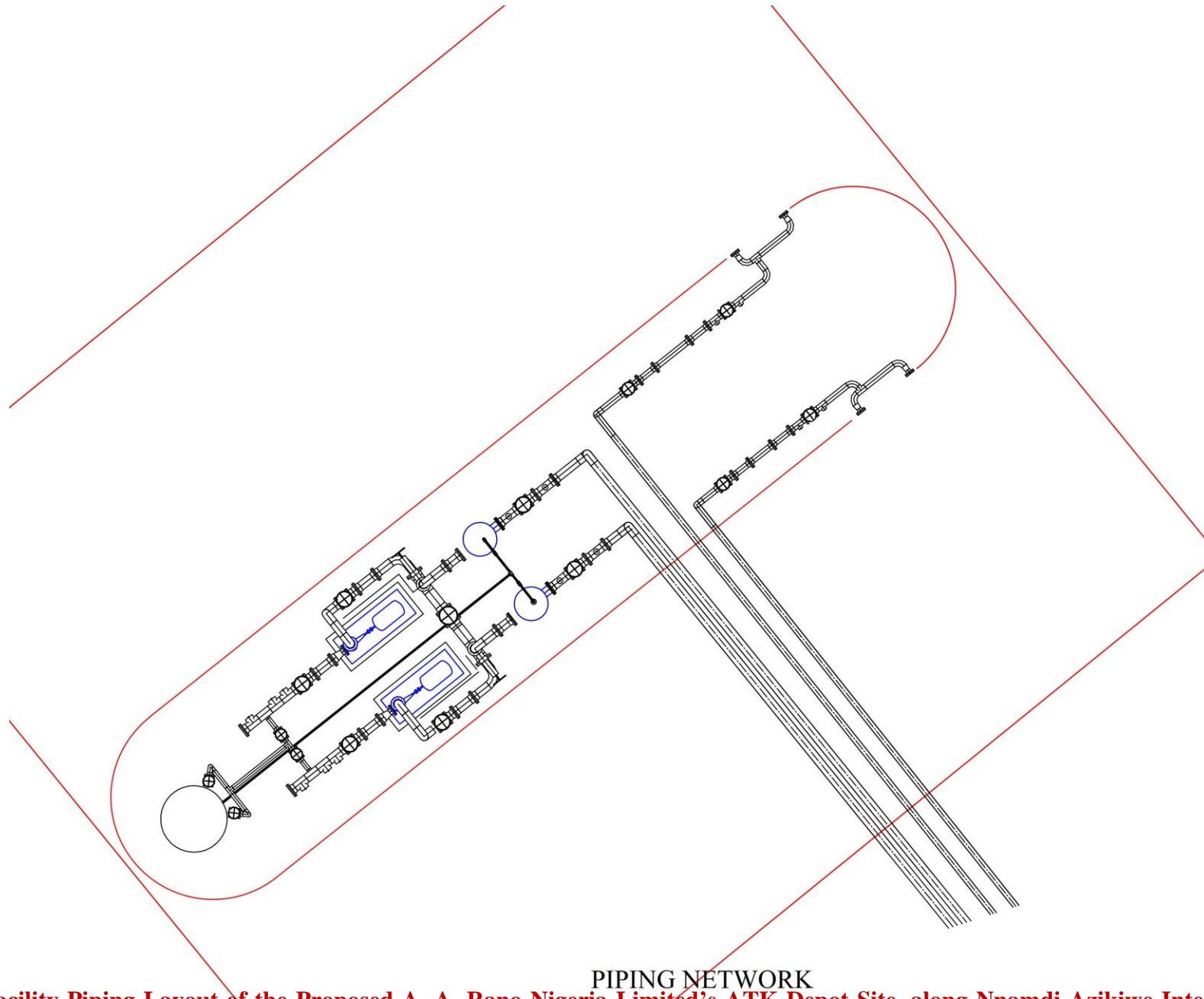
DESIGN BY  
**AWIMAX ENGINEERING SERVICES. LIMITED**  
 ADDRESS  
 36, LAGOS ABEOKUTA EXPRESS WAY,  
 BY EBERT BUS-STOP, OPEMI, LAGOS  
 www.awimax.com  
 email: awimaxengineering@ yahoo.com  
 Tel: 01-261-1111

**Figure 3.17: Fire Water Tank Drawing of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

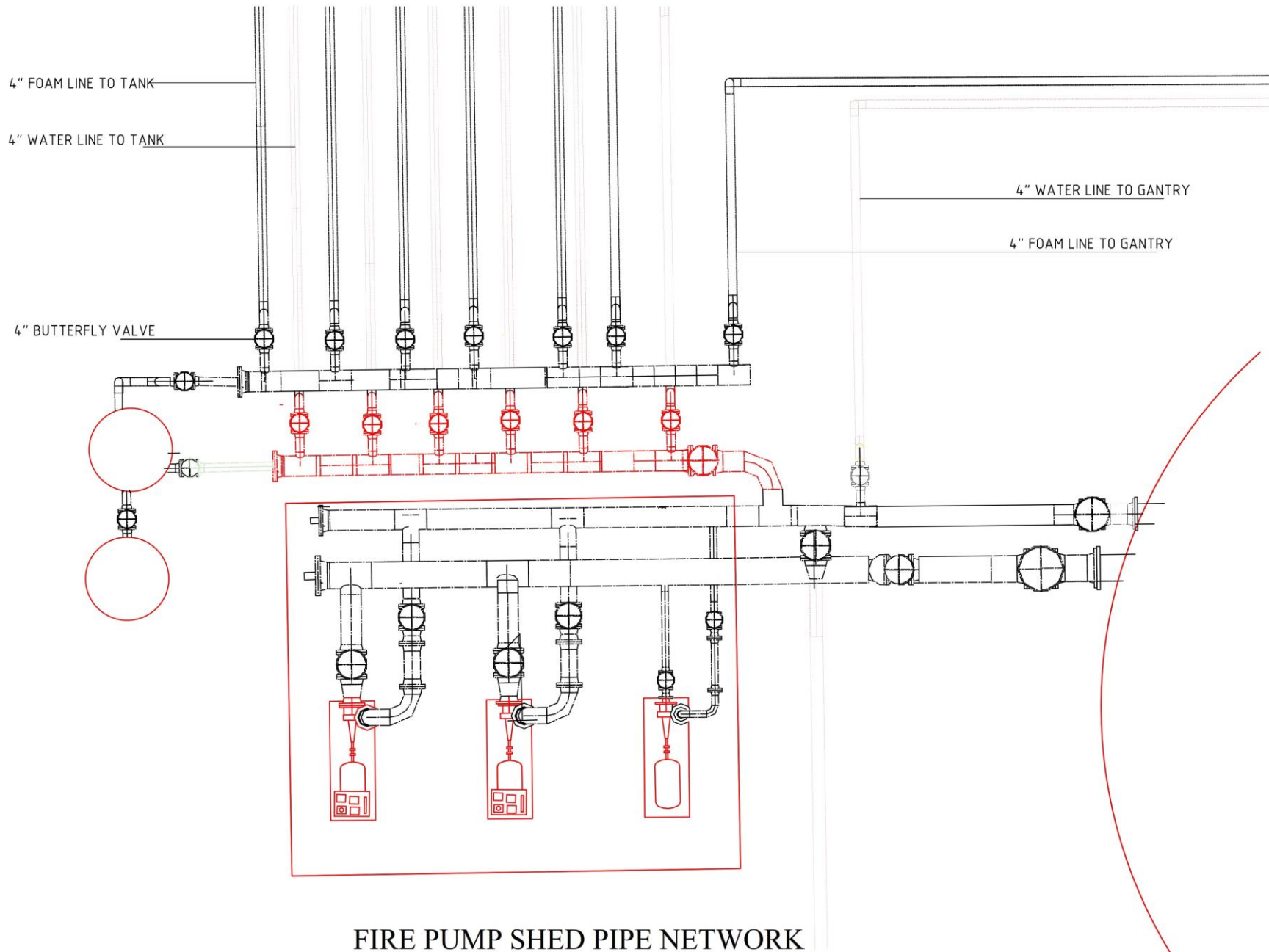


**Figure 3.18: Foam Monitor Drawing for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**





**Figure 3.19: Facility Piping Layout of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



FIRE PUMP SHED PIPE NETWORK

Figure 3.20: Fire Pump Shed Piping Layout of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT

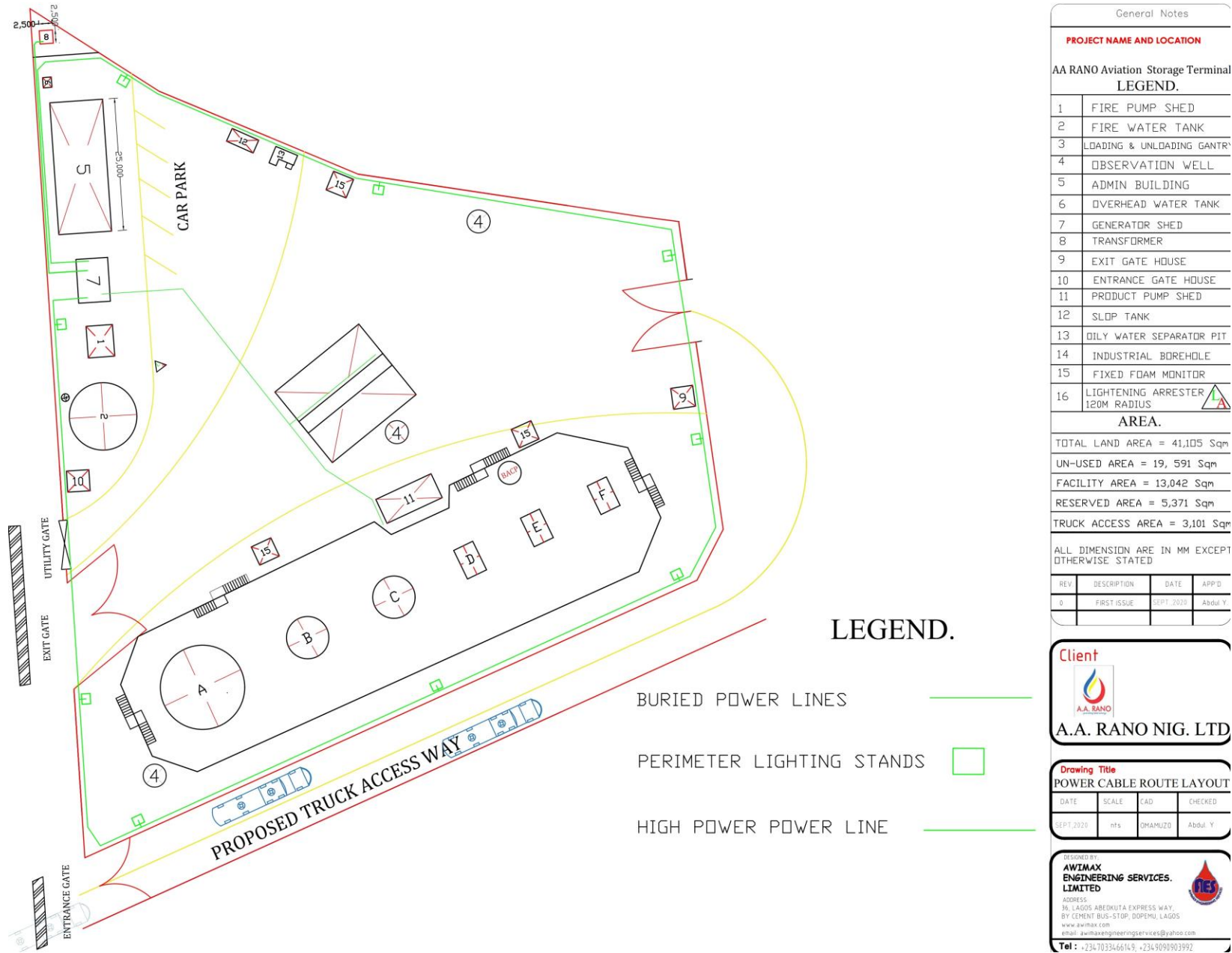
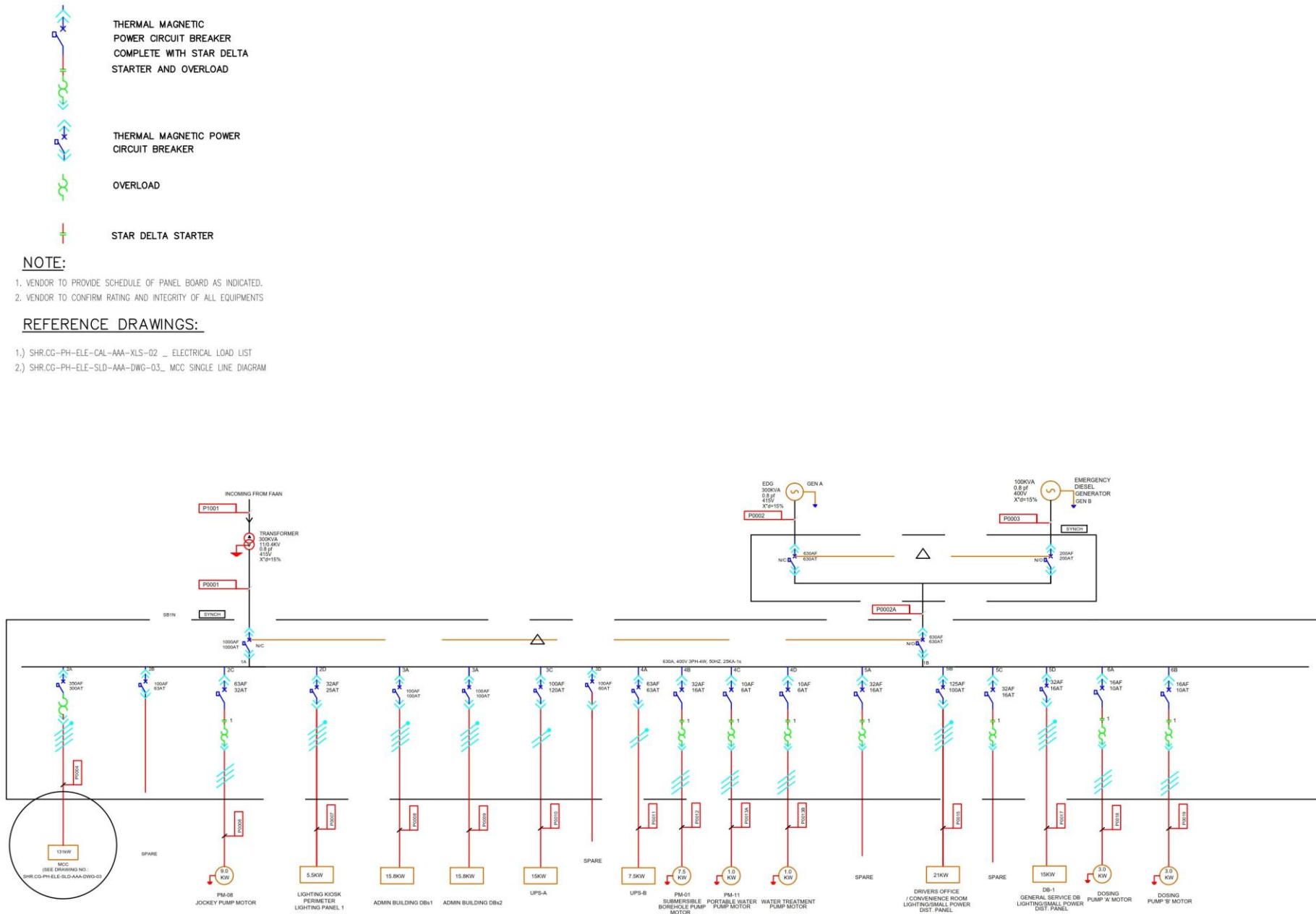
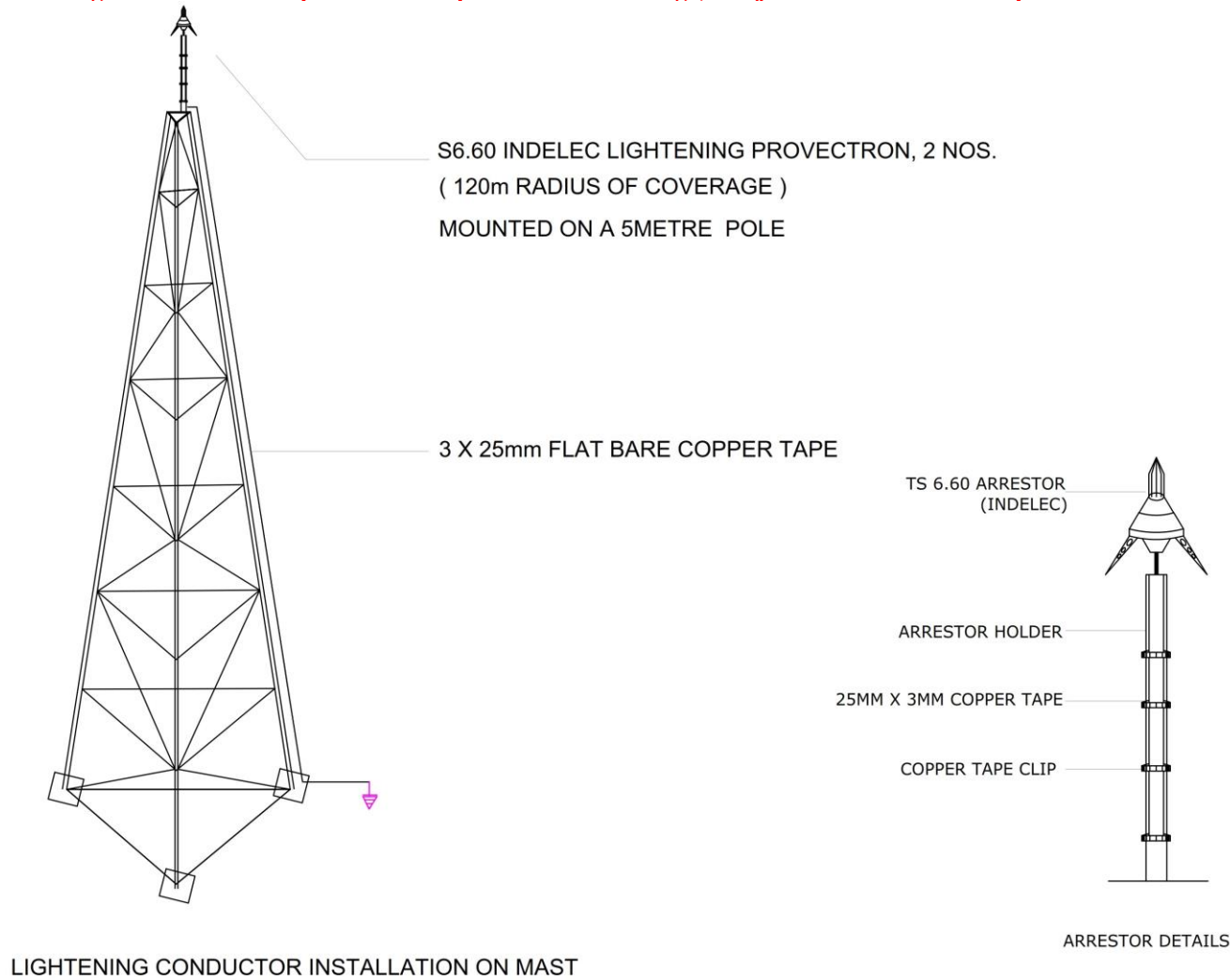


Figure 3.21: Power Cable Route Layout Drawing of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT



**Figure 3.22: Electrical Overall Single Line Diagram of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



### FACILITY LIGHTENING PROTECTION LAYOUT

**Figure 3.23: Lightning and Thunder Arrestor Installation Drawing of the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

Table 3.3: Preliminary Equipment List

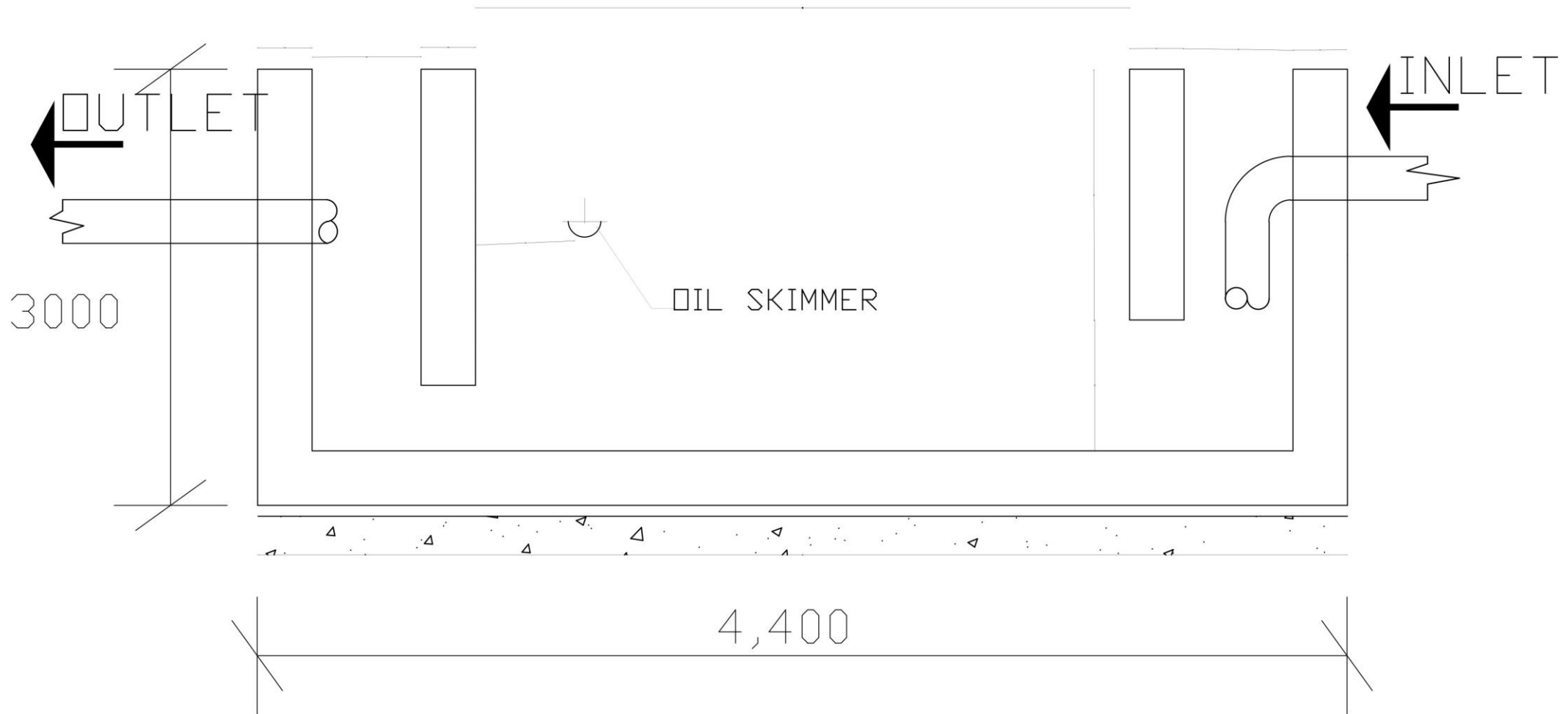
EQUIPMENTS	QUANTITY	UNIT	CAPACITY/ FLOWRATE	MANUFACTURERS / VENDORD
Product Unloading / Loading Pumps	6	Nos	117m3/hr	Flowserve or Johnson Pumps
Flush Pump (This is a very small pump) we should buy in nigeria	2	Nos	7m3/Hr	
Floating Suction (6 inch nozzle, 13m Tank diameter and 11m Height), Connection type - ANSI 150LB. Flat face, Swivel joint-style 40, double track bearings, Tank Manway 24 inch	2	Nos		Gammon
<b>Microfilters</b>				
Model: VF 1644150 Working Pressure: 150psig Micro filters are veritical in orientation, fitted with 4" ANSI 150 inlet and outlet flanges Internally coated with epoxy and externally weather proof painted.	2	Nos	600gpm	VELCON
<b>Vertical Filter Water Separator</b>				
FWS Model: VELCON VV3044 Carbon Steel material in compliance with API 1581 5th Edition Velcon Test Certificate for vessels and filter elements to be provided by vendor. Contractors Scope of supply shall include (1) Spares for Filters (2 sets of spare each) (2) All necessary accessories such as automatic air eliminator, Differential pressure guage with test button for integrity check, SS guage installation Kit, 4" BSP thermal relief valve,	2	Nos	2800L/min	FMC Technologies
Flush Tanks	2	Nos		Local Fabricators
<b>VDR 30 Deaerator</b>		Nos		
Manufacturer: FMC Technologies Model: SmithMeter VDR 30 Deaerator	1		3000L/min	FMC Technologies
Flexible Hose	3	Nos	2m	
Coupling ( 2 <sup>1/2</sup> ")	3	Nos		
Breather Valve (6 inch)	2	pcs		Ergil

#### 3.7.4 Oil-Water Separation:

There will be one (2) Oil-Water Separators (OWS), – on the proposed project site (see figure 3.5 and 3.24). All free-flowing waters within the premises will flow towards a central collection point from where they will then be pumped to the Oil-Water Separators.

The Oil-Water Separator is designed to API standards, which is a standard set by the American Petroleum Institute (API).

This three-chamber tank operating on the principle of gravity separation between oil and water, permits oil-free water to flow from under while oil is trapped on the water surface above due to difference in density / specific gravity. The so-trapped oil will later be skimmed off and temporarily stored in an underground tank to be provided beside the Oil-Water Separator, prior to proper disposal through authorized bodies. The sludge from the Oil-Water Separator will be removed annually or as it becomes necessary; while the sludge so removed will be disposed off, through authorized bodies.



**Figure 3.24: Oil/Water Separator Layout Drawing for the Proposed A. A. Rano Nigeria Limited's ATK Depot Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



### 3.7.5 Monitoring Wells

As an additional measure towards Ground Water Protection, three (3) Monitoring boreholes/wells will be sunk on the site of the proposed Aviation Turbine Kerosene (ATK) Depot Facility. These are to be stabilized for periodic sampling and detection of leakages and possible underground water / soil contamination.

The locations of the Monitoring Wells are as shown in Figure 3.5; and also Table 3.4, below:

**TABLE 3.4: DESIGNATION AND LOCATION OF THE MONITORING WELLS**

S/N	MONITORING WELL DESIGNATION	LOCATION	GEO-COORDINATES	REMARKS
Well 1	AARNL-MW01	Behind Product Pump House	N08° 59'14.724" E007° 16'16.554"	Yet to be in place
Well 2	AARNL-MW02	Adjacent the Bund wall but opposite the Facility Approach Fence (by Tk A)	N08° 59'14.391" E007° 16'13.251"	Yet to be in place
Well 3	AARNL-MW02	By the Rear Fence	N08° 59'14.64" E007° 16'17.591"	Yet to be in place

The water from the three (3) boreholes / monitoring wells is to be monitored constantly in case of any pollution of the aquifer by the products stored in the tank farm and truck park activities.

## 3.8 Hazard and Operability Analyses (HAZOP)

### 3.8.1 Introduction

Hazard and Operability Analysis was carried out for the proposed A. A. Rano Nigeria Limited's ATK depot being cited along Nnamdi Azikiwe International Airport Road, Abuja Municipal Area Council (AMAC), FCT, Abuja. The goal of the analysis was to:

1. Identify and define the major systems, activities and processes involved in the Tank Farm operations;
2. Identify and state the major problems of interest and deviations (upset conditions), which could occur;
3. Identify the hazards that could arise through these deviations;
4. Identify safeguards, which have been included in the Tankfarm process design to reduce hazards;
5. Propose recommendations that may be adopted to mitigate identified hazards.

The main interest/focus for this Tankfarm HAZOP study was to identify ways in which improper performance of tankfarm activities, systems or processes could result in employee injury, equipment damage and environmental harm or stress.

### 3.8.2 Major Tank Farm Processes, Activities and Systems

The major equipment, processes, systems and activities planned for the proposed depot were identified and briefly described below:

1. Civil Structures at the depot – Aviation Fuel, Pipes, Loading Bay, Bund walls, Pumps;
2. Electrical Equipment and Processes - Generators, Cables, Wiring, Distribution boxes and Lighting;
3. Offloading of petroleum products from Tank Trucks into Surface Tanks, and from Surface Tanks into Refueller Tanks;
4. Tanks – Aviation Fuel Tanks, Slop Tanks and Water Tank;
5. Fire Fighting Systems - Water Systems and Foam Systems.

### 3.8.3 HAZOP Analysis

The processes identified in the Tankfarm were subdivided into Sections and sub activities to which the hazard analysis technique was applied. Sections and sub-activities selected represent those, which are considered to be significant, and those in which deviations would represent a serious potential hazard to safety and the environment.

### 3.8.4 Deviations

Deviations (which have potential abnormal conditions compared to normal conditions) were developed for the depot processes. Applying selected guidewords to parameters associated with depot processes, developed the deviations. The developed Deviations are as stated below:

1. No Flow;
2. Less Flow;
3. More Flow Velocity;
4. Reverse Flow;
5. Two Phase Flow;
6. Flow Other than Design Intent;
7. More Pressure;
8. Less Pressure;
9. More Vacuum;
10. Less Vacuum;
11. More Temperature;
12. Less Temperature;
13. More Warm Up / Cool Down Rate / Rapid Changes;
14. More Level;
15. Less/No Level;

16. Change Composition;
17. Change in Properties, e.g., pH, Density, Viscosity, Concentration;
18. Contamination/Impurities;
19. Runaway Reaction;
20. Unwanted Reaction.

### 3.8.5 Potential Hazards

The following is a list of possible hazards to staff, equipment, processes, systems and the environment:

1. Hydraulic (water) Hammer;
2. Explosive/ Flammable Mixtures;
3. Fire (internal/external);
4. Pollution;
5. Excess Noise;
6. Erosion/Corrosion;
7. Vibration (Stress);
8. Sudden Stoppage;
9. Start-up/Shutdown;
10. Static Accumulation/Lightning;
11. Failure Mode Valves;
12. Isolation/ Purging;
13. Cleaning/Loading/Unloading.

### 3.8.6 Significant Environmental Hazards

Through HAZOP Analysis, attempts were made to identify the Environmental Hazards that are likely to pose the most significant threats and these are:

1. Environmental Pollution;
2. Significant Safety Hazards;
3. Workers Health;
4. Waste Management and Handling.

### 3.8.7 Environmental Pollution

Pollution to the environment is expected to most likely result from the following sub-systems of the activities of the proposed depot:

1. Products Loading and offloading;
2. Storage Tanks Leakages;

3. Drainage and Vapour System;
4. Fire Water, Tank Water and Foam Systems; and
5. Oil-Water Separators.

Environmental Pollution may occur should petroleum products spill, drip or pour directly on the ground (polluting both ground and surface water) or into water bodies during tank cleaning, pumping to vessels or shore operations, loading and offloading; and/or as a result of tank over-filling. Specific hazards also exist where concrete flooring does not protect the ground. Pollution is also a potential hazard during release of run-offs or wastewater into nearby water bodies.

In order to reduce the likelihood of pollution, specific plans shall be put in place to ensure enough space in tanks prior to loading and offloading activities, while tanks will only be cleaned under permit and best industry practice conditions. Samples of run-offs will be taken and analyzed and treated before being discharged.

Environmental Pollution is seen as a significant and potentially serious hazard since it could lead to the contamination of surface and underground drinking water sources, and natural habitats for surrounding plant and animal life.

### **3.8.8 Significant Safety Hazards**

#### **3.8.8.1 Fire**

Since the product is a highly flammable / combustible liquid, extreme fire hazards exist in the event of a tank rupture; or as a result of ignition from lightning, static charges or increased temperature within tanks. The vapours of combustible liquids are highly flammable and can be easily ignited.

Automatic fire prevention systems incorporating Foam Pourers and Water Extinguishing Systems are basic necessities. Other necessary requirements are Fire Retardant Clothing for operators working directly around the tanks.

Automatic shutdown systems of valves and gas flare line will be incorporated for safety reasons.

Since health hazards also exist if operators inhale vapours or are otherwise exposed to carcinogenic carbon-based compounds, operators shall be educated on potential hazards and also encouraged to use appropriate protective wears.

- 3.8.8.2** In preparedness for possible fire hazards, A. A. Rano Nigeria Limited has a standing arrangement with Federal Service for help in case of eventualities as part of the emergency provisions.

#### **3.8.9 Workers Health**

Since health hazards also exist if operators inhale vapours or are otherwise exposed to carcinogenic carbon-based compounds, operators shall be educated on potential hazards and also encouraged to use appropriate protective wears.

### 3.9 Waste Management and Handling

Some likely wastes that will be generated at various stages of the proposed project are:

1. Excavated materials generated during the construction of foundations for the tanks and other structures;
2. Metal cuttings and plates from the construction of the tanks;
3. Packaging materials such as crates, drums, cartons, etc;
4. Food and other organic wastes;
5. Hazardous wastes such as paints, anti-corrosion chemicals, oily sludge from Oil-Water Separators, etc;

Along with the planned detailed Waste Management Plan (WMP) for the proposed depot project, there is provision for a third-party waste handler to be appointed by A. A. Rano Nigeria Limited, to handle wastes emanating from the proposed depot project.

#### 3.9.1 Management of Specific Waste Streams

The identified waste streams which are in the form of solid, liquid and gaseous, will be treated and adopted within the "cradle to grave" policy so as to maintain the integrity of the receiving environment. The following are the A. A. Rano Nigeria Limited's planned waste management programme:

- 3.9.1.1 There shall be a documented manual, which will deal principally with how the waste streams from each process or section will be handled, stored (where applicable) and disposed of. The document shall be made available to each department for its personnel.
- 3.9.1.2 Most of the waste streams are liquid in nature, especially wastewater from cooling, sanitary and storm water from the entire compound, which might have oily waste.
  1. WASTEWATER will come mainly as tanks' roofs cooling water, runoffs within the depot premises, runoffs within the bundwalls, etc., these shall be channelled into the central collection tank and thereafter into the Oil-Water Separator being installed along with the project. Following its treatment, the wastewater will be tested to ascertain that it conforms to regulatory requirements before discharge into the nearby lagoon;
  2. AIR EMISSIONS, these gaseous wastes will be handled in such a way as to ensure that the facility's generators will be those that will produce less NO<sub>x</sub>, SO<sub>2</sub>, Carbon Monoxide (CO), Carbon Dioxide (CO<sub>2</sub>), etc; and they will be well maintained in top operating conditions, and in addition, all trucks coming to load at the depot must be roadworthy in every sense;
  3. NOISE, sound proofing all equipment and generating sets to be used, and making sure that all these are regularly and well maintained;

4. SOLID WASTE, most of the solid wastes from this facility will involve solids containing oil, lead batteries, office waste materials (trash and garbage). These will be sorted at source by segregation into containers labelled to indicate the type of waste each will handle. Approved Territorial / Local Government licensed contractors / wastes handlers, will collect and handle such solid wastes;
5. OILY WASTES, these could come in any of these forms – i) storage tank sludge; ii) skimmed oil from Oil-Water Separators; iii) sludge from Oil-Water Separators; iv) solid materials (such as sawdust, rag, sand, etc) used to mop up spills, etc. The first three items will be handled as stated in Section 3.9.2 below while the fourth item will be handled as is the case with solid waste above.

### 3.9.2 Oily Waste Treatment System:

Oily waste water from the various points shall be collected and treated together through the Oil-Water Separators (oily waste treatment system). Oily waste, which could emanate from the cooling water from the products tank, storm water, etc, will first be treated, to remove Oil (pre-separation). The oily wastewater remaining is further treated through another Oil-Water Separator. The Oil-Water Separator is a two (2) stage treatment system. The oil concentration of the treated oily waste water is to be reduced to less than 10mg/l in line with regulatory requirements before it is discharged into the drains. If specification is not met, it will be recycled for further treatment. The sludge from the Oil-Water Separators will be removed annually or as it becomes necessary; while the sludge so removed will be disposed off through authorized bodies. See Figure 3.24, for the Oil-Water Separator Design Layout Drawing.

### 3.10 Summary:

The following are the waste streams identified for the various stages of the proposed A. A. Rano Nigeria Limited's ATK Depot Facility, even though they are not exhaustive:

- (a) During Site Preparation, the following wastes will be generated:
  - (i) Cleared bush remains, woods, etc;
  - (ii) Moved Soil, Rubbles, etc;
  - (iii) Gaseous Emissions, e.g. dust, etc;
- (b) During the Construction phase, the following wastes will be generated:
  - (i) Iron, pipes, metal scrap;
  - (ii) Cement remains;

(iii) Wastewater;

(iv) Excavated Soil;

(v) Human Wastes;

(c) During the Operational phase, the following wastes will be generated:

(i) Storm water;

(ii) Oily wastewater;

(iii) Gaseous emissions/fumes from refined products, generators, vehicles;

(iv) Inside-out heat;

(v) Solid Wastes (papers, packaging materials, plastic bottles, used vehicle parts, disused office equipment, etc.)

See Chapter seven, Figure 7.1 and Tables 7.1a, 7.1b and 7.2.

### **3.11.0 Spill Response and Contingency Plan**

The basic features of the developed and detailed Spill Prevention Control Countermeasure/Emergency Response Plan for product spillage for the tank farm project include:

1. Prevention (which include Foam Spray Systems, Bund Walls, Lightning Arrestors, Oil-Water Separators, Emergency Shutdown Valves and Manual Switches).
2. Minimization;
3. Prompt response and containment;
4. Recovery;
5. Remediation of affected sites;
6. Compensation of affected parties;

See Chapter seven, Figures 7.2a and 7.2b for the Flowcharts for internal/external reporting procedures for oil spill and fire, respectively.

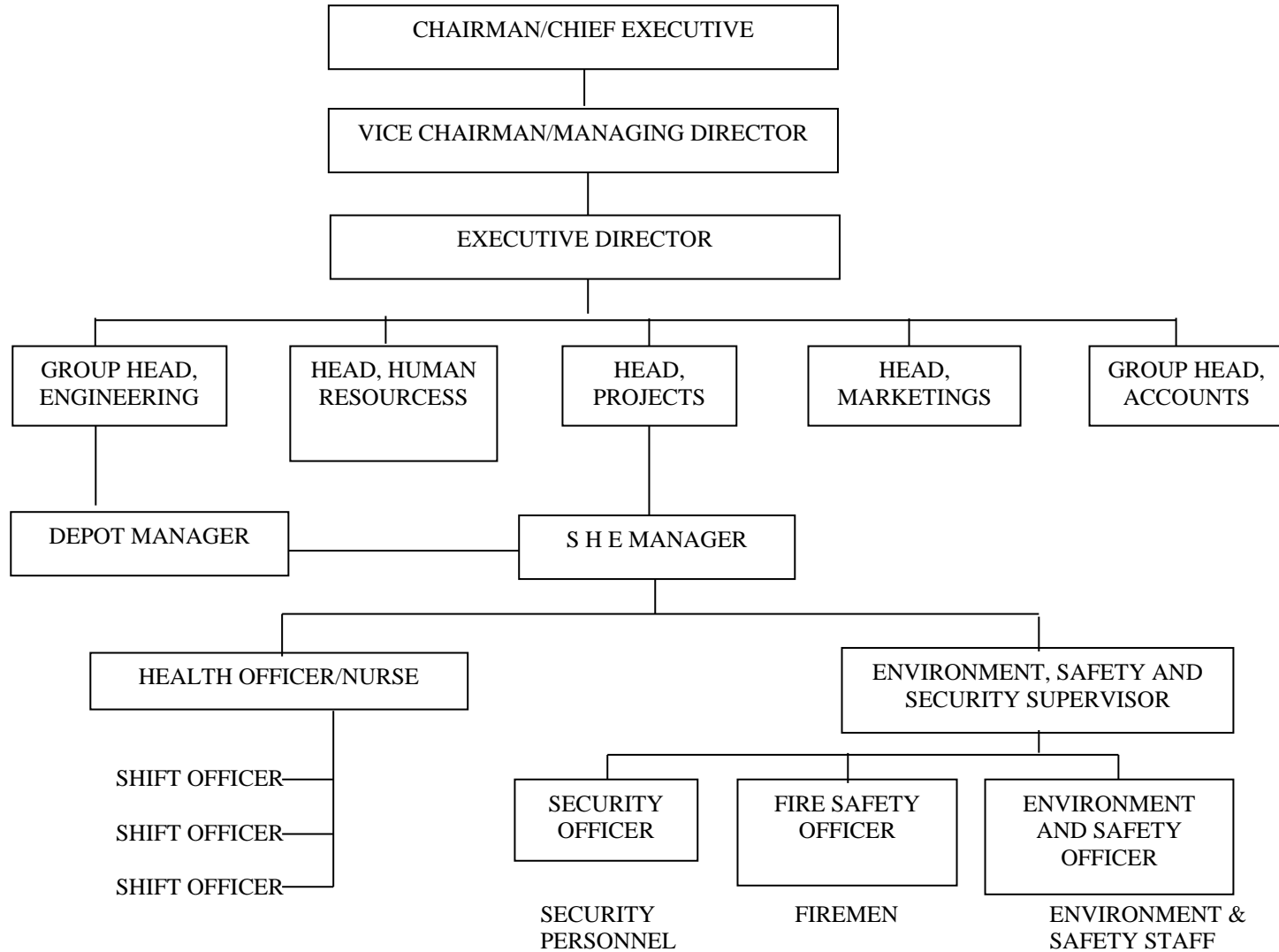
### **3.12 PROJECT IMPLEMENTATION SCHEDULE.**

The proposed project schedule is such that the project would take a total of about twenty-one (21) months for it to be completed. The Gantt Chart (Table 3.5 – Project Implementation Schedule) for all the project activities including: Geotechnical Subsoil Investigation; Conducting EIA Study; Financing; Design of Tank farm Facility; Construction/Installation of the various components of the facility and Commissioning, is provided on the next page.

**Table 3.5: Project Implementation Schedule**

S/N	Activities	2020								2021												2022				
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan				
1.	Geotechnical Subsoil Investigation																									
2.	Conducting EIA Study																									
3.	Financing																									
4.	Design of Depot Facility																									
5.	Preparation of the Site																									
6.	Construction Phase:																									
6a.	Tanks, etc.																									
6b.	Utility Buildings and Installations																									
6c.	Internal Access Construction																									
6d.	Construction of the Trucks Holding Bays and Hard Standing																									
7.	Commissioning of Depot																									





**FIGURE 3.25: SHE ORGANISATIONAL/RESPONSIBILITIES CHART FOR A. A. RANO NIGERIA LIMITED**

### 3.13 ORGANISATIONAL STRUCTURE

The Company is headed by the Chairman. The day-to-day running of the organization is under the function of the Managing Director in association with the Executive Director who is the Chief Environmental Safety Officer, assisted by the Depot Manager. HSE Manager who coordinates the HSE Policies of the Company reports to the Depot Manager (see the Organisational Chart of the Company, Figure 3.25 above).

The HSE Manager liaises with the Depot Manager (who reports to the Executive Director) on Safety, Health and Environmental matters. The HSE Manager is responsible for training, interpretation and implementation of policies on HSE; responding to emergency calls, Safety, Health and Environmental matters.

## CHAPTER FOUR

### **4.0 DESCRIPTION OF PROJECT ENVIRONMENT**

#### **4.1 INTRODUCTION**

A very important aspect of Environmental Impact Assessment (EIA) is baseline data acquisition. The quality of information used in the assessment and the overall integrity of the report depends greatly on the source of data, the methodology of data acquisition, the team involved in the EIA process and the scope of stakeholder consultation / involvement. In this section of the EIA, Current Environmental Condition (being a brown field, that is, an already impacted areas), data on the environmental characteristics of the project area are presented. The baseline data collected will serve as a veritable benchmark against which data to be collected later during post implementation monitoring, shall be compared in order to establish the effectiveness (or otherwise) of mitigation measures to be put in place.

##### **4.1.1 Current Environmental Condition and Data Acquisition Methodology:**

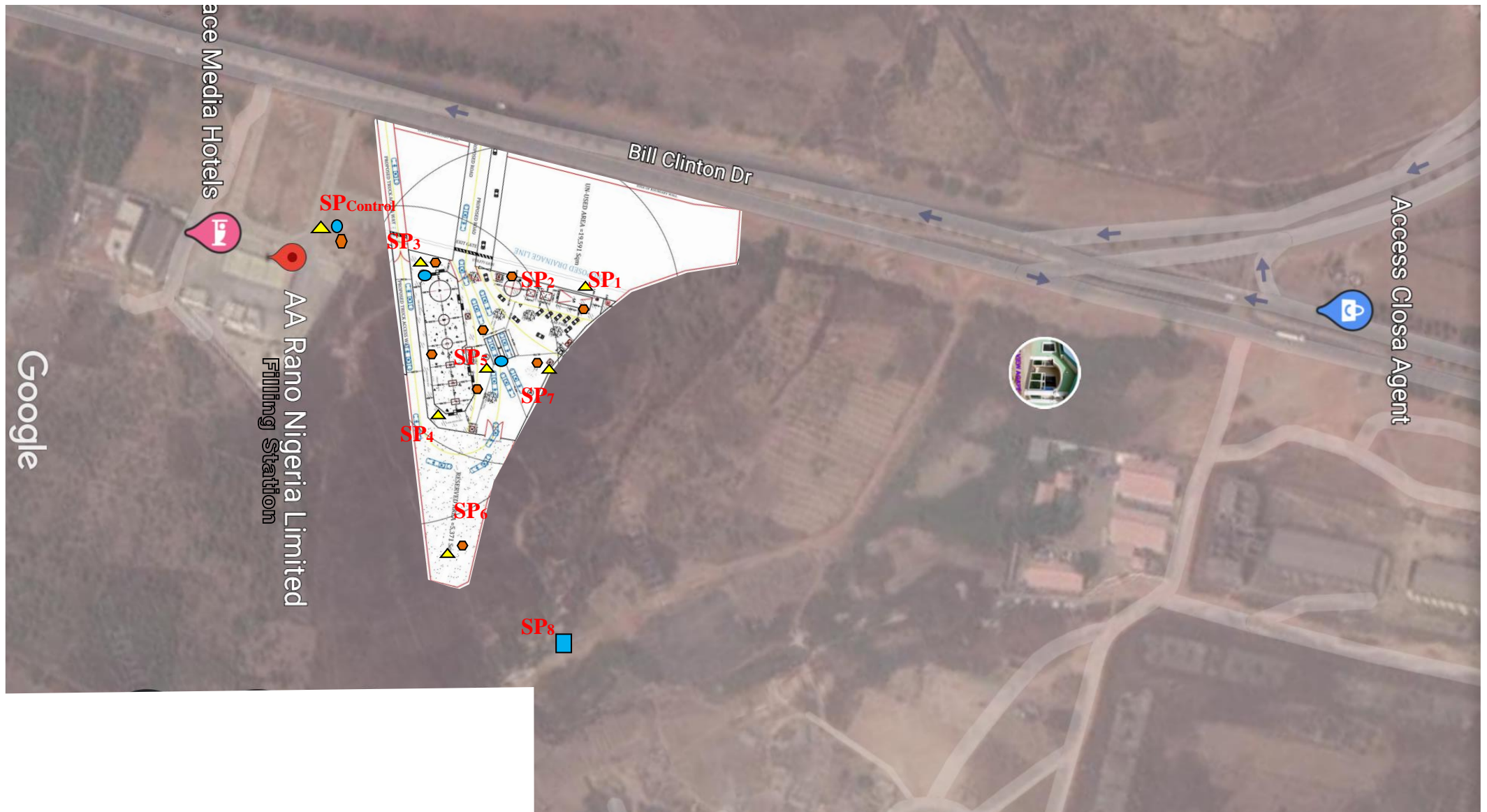
The approach to baseline data acquisition was an integrated and interdisciplinary one. All relevant fields of disciplines necessary for a thorough analysis of the physical, chemical, biological and socio-economic environment were incorporated. The methods of data acquisition involved desk studies, literature surveys, groundtruthing, field surveys / sampling and laboratory analyses.

##### **4.1.2 Sampling Methodology**

As the location of the proposed A. A. Rano Nigeria Limited's ATK Depot is within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, a place specifically layed out for projects of this type, by the Federal Aviation Administration of Nigeria (FAAN), with the EIA of the general area haven been conducted and EIA / EMP for other projects conducted within Aviation Village, within the past two (2) years, we have leveraged on the data contained in the EMP (2019) of Everlink Telesat Network Limited, which has its Four Star Hotel project, also along Nnamdi Azikiwe International Airport, Aviation Village, just as A. A. Rano Nigeria Limited's ATK Depot, though a different project; about 1.85km away and sharing same geographical and ecological characteristics (where twenty-two (22) samples were collected).

In addition to the above-stated, a single season data gathering (field works) exercise was conducted in October 2020, during which twenty-six (26) samples were collected.

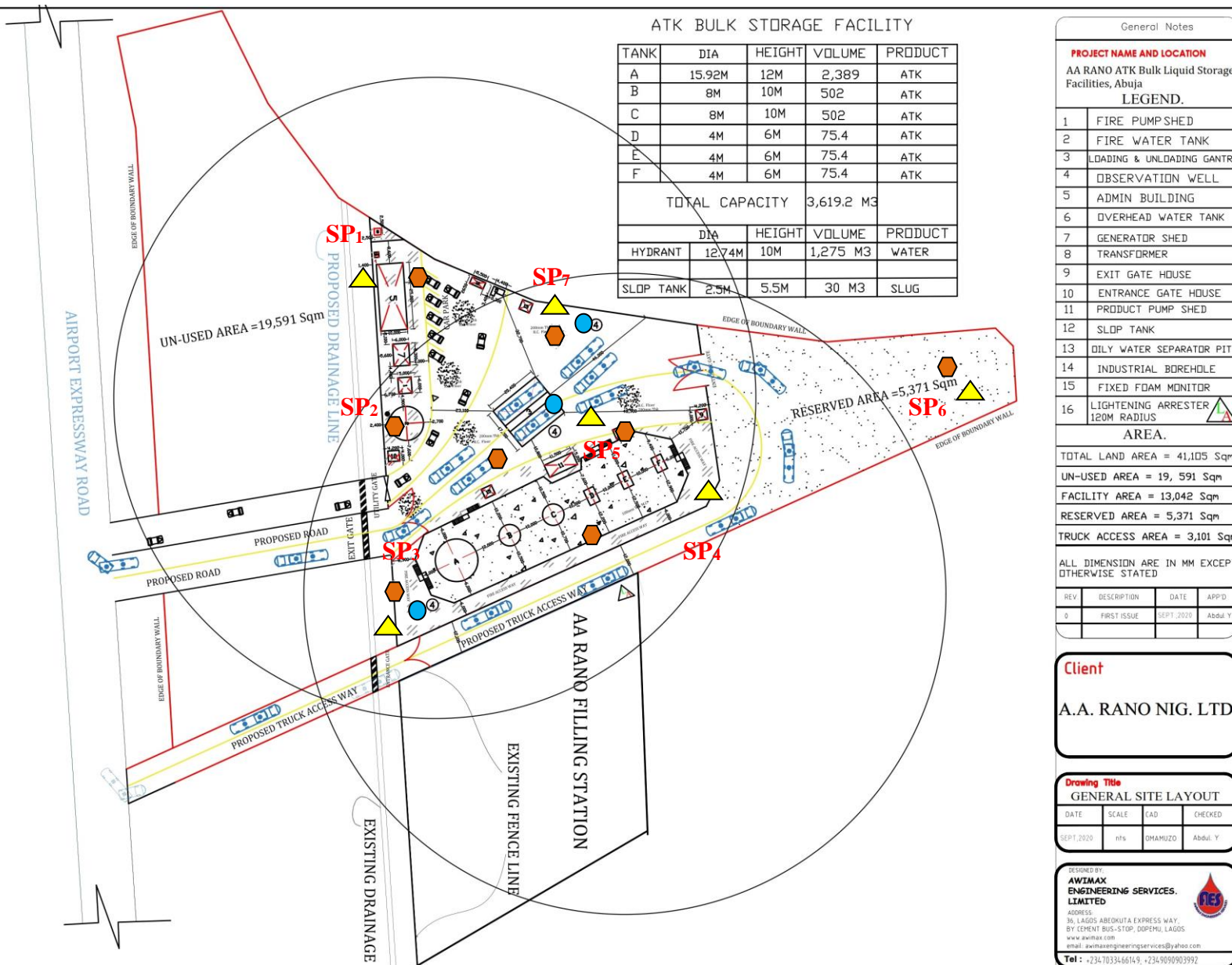
**See Figures 4.1 to 4.3; Table 4.1; and Plates 4.1 to 4.8, below.**



**Figure 4.1:** Satellite Map of Nnamdi Azikiwe International Airport Environ showing the Sampling Points (for Data Gathering Exercise) on and around the Proposed A. A. Rano Nigeria Limited's Depot Site, Bill Clinton Dr, Abuja Municipal Area Council (AMAC), Abuja, FCT

**LEGEND:**

- ▲ Air and Noise
- Ground Water
- ⬡ Soil
- Surface Water
- SP<sub>1</sub> – SP<sub>8</sub> - Sampling Points 1 to 8



**Figure 4.2: Sampling Diagram (for Data Gathering Exercise) on the Proposed A. A. Rano Nigeria Limited's Depot Site, Bill Clinton Dr, Abuja Municipal Area Council (AMAC), Abuja, FCT**

**LEGEND:**

- ▲ Air and Noise
- Ground Water
- ⬡ Soil
- Surface Water
- SP<sub>1</sub> - SP<sub>7</sub> - Sampling Points 1 to 7

General Notes

**PROJECT NAME AND LOCATION**  
AA RANO ATK Bulk Liquid Storage Facilities, Abuja

**LEGEND.**

1	FIRE PUMP SHED
2	FIRE WATER TANK
3	LOADING & UNLOADING GANTRY
4	OBSERVATION WELL
5	ADMIN BUILDING
6	OVERHEAD WATER TANK
7	GENERATOR SHED
8	TRANSFORMER
9	EXIT GATE HOUSE
10	ENTRANCE GATE HOUSE
11	PRODUCT PUMP SHED
12	SLOP TANK
13	OILY WATER SEPARATOR PIT
14	INDUSTRIAL BOREHOLE
15	FIXED FOAM MONITOR
16	LIGHTNING ARRESTER 120M RADIUS

**AREA.**

TOTAL LAND AREA = 41,105 Sqm  
 UN-USED AREA = 19, 591 Sqm  
 FACILITY AREA = 13,042 Sqm  
 RESERVED AREA = 5,371 Sqm  
 TRUCK ACCESS AREA = 3,101 Sqm

ALL DIMENSION ARE IN MM EXCEPT OTHERWISE STATED

REV	DESCRIPTION	DATE	APP'D
0	FIRST ISSUE	SEPT. 2020	Abdul Y.

**Client**

A.A. RANO NIG. LTD

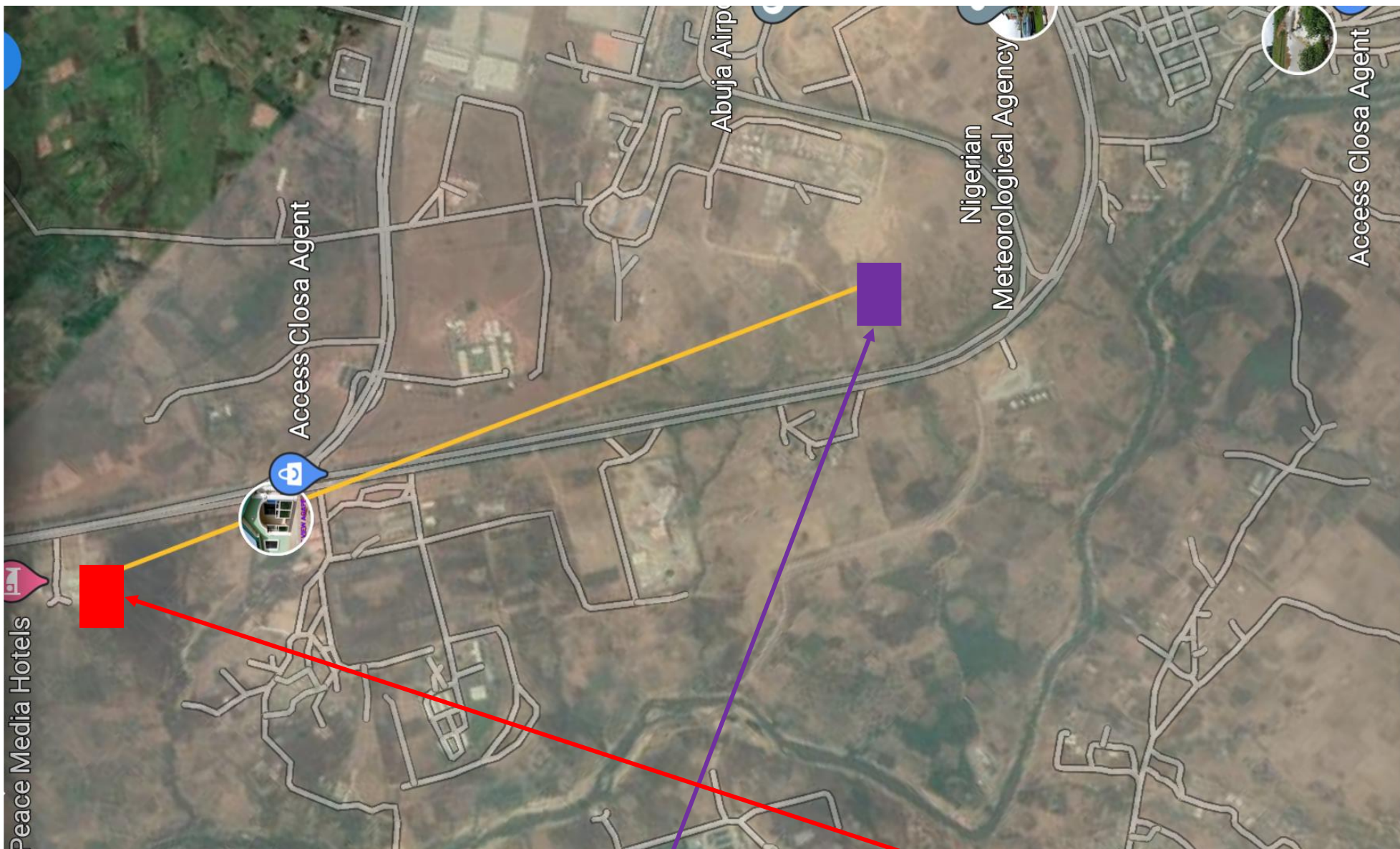
**Drawing Title**

GENERAL SITE LAYOUT

DATE	SCALE	CAD	CHECKED
SEPT. 2020	n/s	DMAMUZO	Abdul Y.

DESIGNED BY  
**AWIMAX ENGINEERING SERVICES. LIMITED**

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**Figure 4.3: Satellite Map of Nnamdi Azikiwe International Airport, Abuja and Environs with Red Arrow Pointing at the Proposed A. A. Rano Nigeria Limited's ATK Depot Site along Bill Clinton Dr (Nnamdi Azikiwe International Airport Road), Aviation Village, Abuja Municipal Area Council (AMAC), Abuja, FCT; and with Purple Arrow Pointing at the Everlink Telesat Network Limited's Four Star Hotel Site, along Nnamdi Azikiwe International Airport Road, Aviation Village, Abuja Municipal Area Council (AMAC), Abuja, FCT, About 1.85 km Apart**

**TABLE 4.1: SAMPLING SCHEDULE (TABLE) FOR SAMPLING LOCATIONS SHOWN ON FIGURES 4.1, 4.2 AND 4.3**

ITEM NO.	SAMPLING POINTS	ENVIRONMENTAL ATTRIBUTES SAMPLED	SAMPLING POINTS COORDINATES:		TOTAL NUMBER OF SAMPLES (@ 1 SAMPLE / ENVIRONMENTAL ATTRIBUTE)
			LATITUDE	LONGITUDE	
<b>FOR SAMPLES TAKEN ON AND AROUND THE PROPOSED A. A. RANO NIGERIA LIMITED'S ATK DEPOT PROJECT SITE – OCTOBER 2020</b>					
1.	SP <sub>1</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'18.463"	E007° 16'16.619"	3
2.	SP <sub>2</sub>	1.) Soil;	N08° 59'15.9"	E007° 16'14.9"	1
3.	SP <sub>3</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (GW2); 3.) Soil;	N08° 59'14.391"	E007° 16'13.251"	4
4.	SP <sub>4</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'12.746"	E007° 16'14.581"	3
5.	SP <sub>5</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (GW1); 3.) Soil;	N08° 59'14.724"	E007° 16'16.554"	4
6.	SP <sub>6</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'14.64"	E007° 16'17.591"	3
7.	SP <sub>7</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'17.275"	E007° 16'18.048"	3
8.	SP <sub>8</sub>	1.) Surface Water;	N08° 59'14.0"	E007° 16'21.7"	1
9.	SP <sub>Control</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (Existing Borehole); 3.) Soil;	N08° 59'14.0"	E007° 16'12.5"	4
					<b>26 SAMPLES</b>
<b>FOR SAMPLES TAKEN ON NEARBY FACILITY - EVERLINK TELESAT NETWORK LTD'S FOUR STAR HOTEL PROJECT SITE 1.85 KM AWAY - APRIL 2019</b>					
10.	A1	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'6.912"	E007° 16'39.144"	3
11.	A2	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'10.152"	E007° 16'39.54"	3
12.	A3	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'8.892"	E007° 16'38.892"	3
13.	A4	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'7.776"	E007° 16'38.244"	3
14.	A5	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'5.58"	E007° 16'37.236"	3
15.	A6	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'4.968"	E007° 16'38.136"	3
16.	A7	1.) Noise Level;	N09° 0'6.336"	E007° 16'37.596"	1
17.	A8	1.) Noise Level;	N09° 0'3.78"	E007° 16'39.144"	1
18.	A9	1.) Noise Level;	N09° 0'8.496"	E007° 16'39.0"	1
19.	A10	1.) Noise Level;	N09° 0'9.144"	E007° 16'40.152"	1
					<b>22 SAMPLES</b>
<b>TOTAL</b>	<b>19 SAMPLING POINTS</b>	<b>4 MAIN ENVIRONMENTAL ATTRIBUTES</b>			<b>48 SAMPLES</b>

### Samples and Sampling

The project influence area had already been adequately studied. A project earlier studied within the area was partly leveraged on.

The Analytical Methods used for the various parameters tested for are as indicated in Tables 4.2 and 4.3.

**TABLE 4.2: ANALYTICAL METHODS FOR LIQUID WASTE ANALYSIS**

S/N	PARAMETERS	METHODOLOGY
<b>A</b>	<b>Physico-Chemical Analysis</b>	
1.	pH	Potentiometric
2.	Total Suspended Solids (TSS) and Total Dissolved Solids (TDS)	Gravimetric
3.	Metals, Cyanide, Sulphide, Phenol, Phosphate, Ammoniacal Nitrogen, Nitrate	Colorimetric
4.	Alkalinity, Acidity, Hardness, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD)	Titrimetric
5.	Sulphate	Turbidimetric
6.	Chloride	Argentometric
7.	Oil/Grease	Extraction
8.	Detergent	Methylene Blue
<b>B</b>	<b>Microbiological Analysis</b>	
9.	Total Coliforms	Lactose Fermentation Technique
10.	Total Plate Count	Pour Plate Method

**TABLE 4.3: ANALYTICAL METHODS FOR SOIL ANALYSIS**

S/N	PARAMETERS	METHODOLOGY
1	Moisture Content, Total Ash, Insoluble Silica Content, Organic Matter	Gravimetric
2	pH	Potentiometric
3	Calcium, Magnesium	Titrimetric – EDTA
4	Sodium, Potassium	Flame Photometric
5	Lead, Chromium, Cadmium, Iron, Manganese and Total Phosphate	Colorimetric
6	Sulphate	Turbimetric
7	Chloride	Titrimetric

**Air:** The air quality assessment was carried out by estimating levels of Total Suspended Particulate (TSP), Elemental Composition of Particulates, and Noxious Gases (NO<sub>x</sub>, SO<sub>2</sub>, CO and H<sub>2</sub>S), Noise Level.

The field sampling techniques and laboratory procedures adopted are summarized below:

#### 4.1.3 Air Quality Studies

For this aspect of the EIA, the levels of Total Suspended Particulates (TSP) and its elemental components were determined, as well as, the levels of Noxious Gases such as NO<sub>x</sub>, SO<sub>2</sub>, CO and H<sub>2</sub>S.



### Equipment and Method Used

**Crowcon Gasman Units for Determination of Noxious Gases - CO, SO<sub>2</sub>, NO<sub>2</sub> and H<sub>2</sub>S were used.**

Each unit of Gasman is designed to monitor the presence of specific Noxious Gases using an electrochemical sensor. The sensitivity or ranges of gas levels that can be measured by each unit are outlined below:

Carbon Monoxide (CO): 0 - 500ppm

Sulphur Dioxide (SO<sub>2</sub>): 0 - 10ppm

Nitrogen Dioxide (NO<sub>2</sub>): 0 - 10ppm

Hydrogen Sulphide (H<sub>2</sub>S): 0 - 10ppm

### Equipment and Method Used

**Sibata Digital Dust Indicator (Model P 150) was used for Determination of Particulate Concentration in Air**

This unit is designed to measure the particulate level in the air continuously.

The sensitivity range of the unit range from 0.1µg/m<sup>3</sup> - 100µg/m<sup>3</sup>.

### Equipment and Method Used

**Air CHECK Air Monitoring Pump for Scrubbing Air to be analyzed For Elemental Composition of Particulate in the Air.**

A total volume of 60 litres of air was scrubbed through a whatman membrane filter (0.4µm) to retain the particulate with the aid of the pump set at a flow rate of 12LPM for 5 minutes. The loaded filter paper was digested and the elemental composition was determined with the aid of the atomic absorption spectrophotometer (AAS).

### Noise Level (dB (A))

The need for Noise Level measurements in Environmental Impact Assessment studies cannot be over emphasized, for Noise can affect the physiology of human body in three important ways:

1. Internal Bodily Systems – defined as those physiological systems essential for life support, that is, cardiovascular (heart, lung, vessels) gastrointestinal (stomach, intestines), neural (nerves), musculoskeletal (muscles, bones), and endocrine (glands). Noise stimulation of nerve fibres in the ear may indirectly harmfully affect these systems. High intensity noise constricts the blood vessels, increases pulse and respiration rates, increases tension and fatigue, and can cause dizziness and loss of balance.
2. Hearing Threshold – defined as the lowest sound level or loudness of a noise that can be heard, the lower the hearing threshold the better. If the sound level necessary for a noise

to be heard (or hearing threshold) is higher than normal, then hearing loss or partial deafness is indicated.

3. Sleep Pattern – defined as a natural regularly recurring condition of rest, and is essential for normal body and mental maintenance and recuperation from illness.

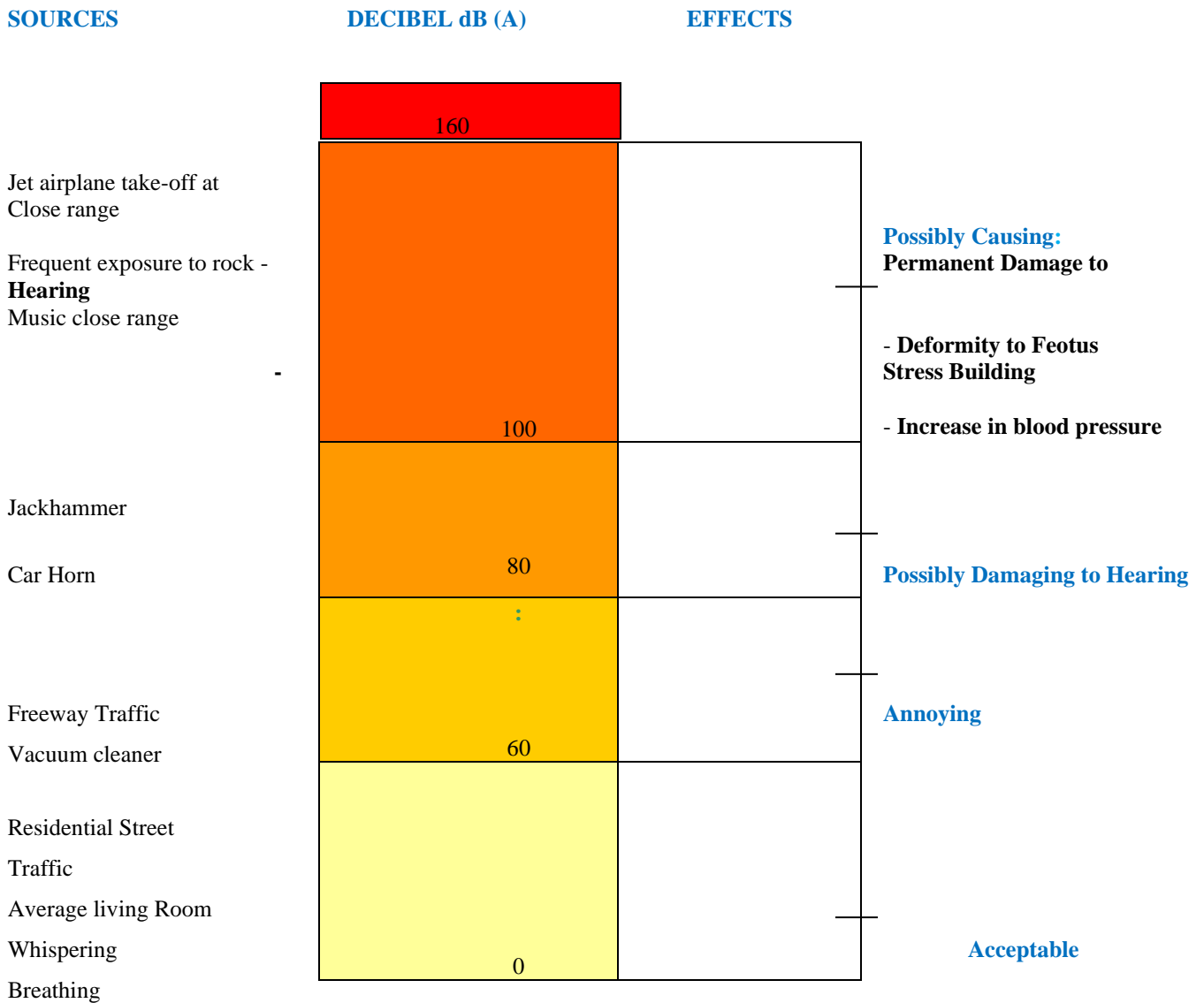
The disruption or lack of sleep results in irritability, often-irrational behaviour, and desire for sleep.

For the purpose of guiding against the negative impacts of Noise Pollution on the citizenry, the Government has set Noise Exposure Limits for country; this is shown in Table 4.4 below, while Figure 4.4 shows approximate decibel levels from some common sources of noise and effects of noise at different decibel levels.

**TABLE 4.4: NOISE EXPOSURE LIMIT FOR NIGERIA**

<b>DURATION PER DAY(HOURS)</b>	<b>PERMISSIBLE EXPOSURE LIMIT dB(A)</b>
<b>8</b>	<b>90</b>
<b>6</b>	<b>92</b>
<b>4</b>	<b>95</b>
<b>3</b>	<b>97</b>
<b>2</b>	<b>100</b>
<b>1.5</b>	<b>102</b>
<b>1</b>	<b>105</b>
<b>0.75</b>	<b>107</b>
<b>0.50</b>	<b>110</b>
<b>0.25</b>	<b>115</b>

Source: Guidelines and Standards for Environmental Pollution Control in Nigeria (FEPA GREEN BOOK)



**FIGURE 4.4: APPROXIMATE DECIBEL LEVEL FROM SOME COMMON SOURCES OF NOISE AND EFFECTS**

As repeated Exposure to Noise Levels beyond 80 dB (A) can lead to gradual loss of hearing, therefore, it is safe practice for persons in areas with Noise Levels above 80 dB (A) to always put on/wear hearing protectors.

The Noise Levels in the project area were determined using a Sound Meter, Ribido Model A-13.

#### 4.1.4 CLIMATE AND METEOROLOGY

The information used and presented for this report were acquired from a number of complementary sources. These include:

1. Those collected from the Nigeria Department of Meteorological Services;
2. Those downloaded from Internet (from World Meteorological Organization, Hong Kong Observatory and Cimatetemps.com);
3. Those from some relevant literature materials on the weather and climate of the project site and its surrounding environment; and
4. Those from some observations from a number of field works that were carried out around the project site.

The data collected from the Nigerian Department of Meteorological Services and Internet include those on rainfall, temperature, humidity, sunshine, and wind direction and speed. These were supplemented by data on the other various components as obtained from existing literature.

Using information from these sources, and observation during the field works, data on the various climate elements were generated and used for discussions on the characteristics and impact identifications of weather and climate in the study area. The compiled data were analyzed on an electronic spread sheet. The facilities were also used to produce the illustrative table and graphs presented in this report as deemed necessary for meeting the objectives and aspirations of the study.

#### 4.1.5.4 Microbiology

Soil and ground water samples were collected in sterilized containers and the microbial types were identified. For this identification, four (4) microbiological media, Nutrient Agar (NA), Potato Dextrose Agar (PDA), Blood Agar (BA) and Mac Agar Conkey (MAC) were used for the isolation of bacteria, fungi, pathogens and coliforms respectively.

One (1) ml water sample was transferred to a test tube containing 9ml sterilized water. Aliquots from both low and high dilutions (0.1ml) of each sample was plated separately on the prepared media for bacteria and four (4) replicates were made; two (2) were incubated anaerobically and the remaining two (2) aerobically at 37°C for two (2) days. One (1) replicate was made for fungal isolation and incubated aerobically at 30°C for three (3) days. At the end of incubation, the isolates were screened, counted and identified based on the taxonomic schemes descriptions provided by Buchanan and Gibbon, 1974; Smith, 1969.

#### 4.1.6 Vegetation Studies

For the vegetation study of the proposed ATK Depot Facility project site at Aviation Village, the various vegetation plant types in the near and adjacent land were collected at the sight. They

were carefully studied and identified in-situ (on sight) while for those that cannot be properly identified on the site, their sampled leaves and stems were taken and preserved fresh in large sample bottles in a cool moist place to avoid drying up for onward Laboratory identification and studies.

#### 4.1.7 Soil Studies

At each sampling station, surface soil samples (0-15cm and 15cm-30m depths, respectively) were collected with the aid of an auger. The samples were preserved in polythene bags and transferred to the laboratory for further analysis. The samples for hydrocarbon analysis were kept in aluminium foil and refrigerator prior to laboratory analyses. The soil samples were analyzed in the laboratory to determine its pH, Organic Carbon, Exchangeable Bases, Nitrogen (NO<sub>3</sub>-N), Heavy Metals (Zn, Fe, Al, Mn, Mg, Ca and K) and Hydrocarbon Content.

#### 4.1.8 Socio - Economic Studies

This section discusses the social, cultural and economic characteristics of the project environment. Specifically, it is tailored towards addressing the basic human activities and interests in the area. It also attempts to establish the probable impacts of the project activities in this perspective as well as suggest the feasible measures that can ameliorate them. The study approach takes into consideration such recommended guidelines by the erstwhile Federal Environmental Protection Agency (FEPA) now Federal Ministry of Environment (FMEnv), National Environmental Standards and Regulations Enforcement Agency (NESREA), and Department of Petroleum Resources (DPR).

#### 4.1.9 Land Use and Environmental Sensitivity Studies

Information on the land use, cover and other environmental resources of an area can be acquired only if the data from both the space, atmosphere and ground surfaces are integrated with those from a number of other collateral sources. The set of maps, and aerial photographic remote sensing products covering the region were adopted for the study.

The series of map assessed for the study include: -

1. The Administrative Map of Abuja FCT from internet (researchgate.net);
2. The Nigerian Topographical Map produced by the Federal Surveys Department;
3. The Operational Maps of A. A. Rano Nigeria Limited and its contractors (i.e., the Surveyors and Engineers), which were made available in hardcopies and at various scales;
4. A set of Administrative / Political Maps of Nigeria at scales ranging between 1:250,000 and 1:1,000,000 from internet (wikipedia.com);
5. Geological Map of Abuja FCT;

#### **4.1.10 Waste Management Assessment**

This component of EIA involved survey and identification of different sources of wastes from all activities already in place before the new project. The different types of wastes generated presently at the various sections within the facility and their mode of disposal were carefully noted and recorded. Existing waste management options were studied and analyzed, while adequate waste management options were proffered.

## 4.2 RESULTS AND DISCUSSION

### 4.2.1 Climate and Meteorology

#### 4.2.1.1 Introduction

Climate controls the natural forces that act on virtually all the components of the ecosystem. In addition to determining the components of the environment, it also modifies the structural differences between them with a motive of maintaining a balanced equilibrium. This section of the EIA discusses the seasonal variability of the most dominant climatic elements and factors within the project area. It also predicts the probable impacts of the proposed petroleum products tank farm on the general environment.

#### 4.2.1.2 Baseline Information

The entire project area, within Abuja Municipal Area Council (Coordinates: 8.90433 7.32930 9.22433 7.64930 – Minimum Elevation: 292 m - Maximum Elevation: 933 m - Average Elevation: 499 m), in Abuja, Federal Capital Territory (FCT), falls under the tropical wet and dry climate. The FCT experiences the following three weather conditions annually:

- 1.) warm, humid rainy season;
- 2.) blistering dry season; and
- 3.) a brief harmattan season as interlude between the first two.

The major climatic elements of the area include: rainfall; temperature, wind (speed and direction); relative humidity and sunshine. Similarly, the major climatic factors include: latitudinal location; elevation; prevailing winds over the season, apparent movement of the sun across the tropics; and relative stability of the Inter Tropical Convergence Zone (ITCZ).

Tables 4.5 and 4.6, and Figures 4.5 to 4.7, present the summary records / mean of these elements, over years, as relate to the proposed project site. A brief description of each of the identified climatic characteristics of the project area is presented below:

#### (a) Ambient Temperature (Air Temperature)

As stated above, the study area is located within the tropical wet and dry climate. Hence, it has a high precipitation and relative humidity.

As shown in Table 4.5, temperature of the project area ranges from a minimum (monthly temperature) of 16.9°C in December to maximum (monthly temperature) of 35.1°C in March.

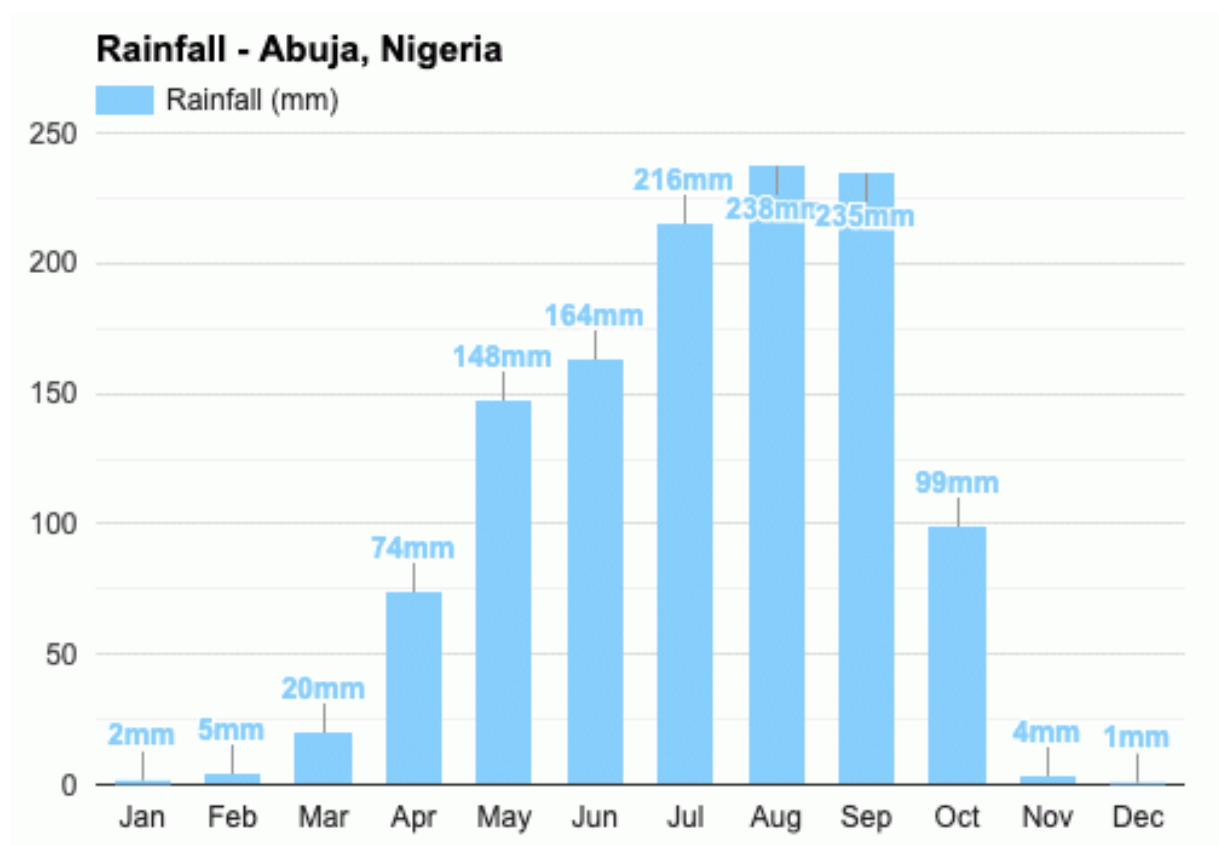
The average monthly temperature ranges from 23.9°C (August) to 28.5°C (April).

**Table 4.5: Abuja Weather by Month - Mean High and Low Temperature Values**

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	25	26.8	28.4	28.5	26.9	25.1	24.3	23.9	24.4	25.3	25.6	24.7
Min. Temperature (°C)	17.6	19.5	21.7	22.7	22	20.6	20.4	20.2	19.9	19.9	18.8	16.9
Max. Temperature (°C)	32.5	34.2	35.1	34.4	31.8	29.6	28.2	27.7	28.9	30.7	32.5	32.6
Avg. Temperature (°F)	77.0	80.2	83.1	83.3	80.4	77.2	75.7	75.0	75.9	77.5	78.1	76.5
Min. Temperature (°F)	63.7	67.1	71.1	72.9	71.6	69.1	68.7	68.4	67.8	67.8	65.8	62.4
Max. Temperature (°F)	90.5	93.6	95.2	93.9	89.2	85.3	82.8	81.9	84.0	87.3	90.5	90.7

**(b) Rainfall**

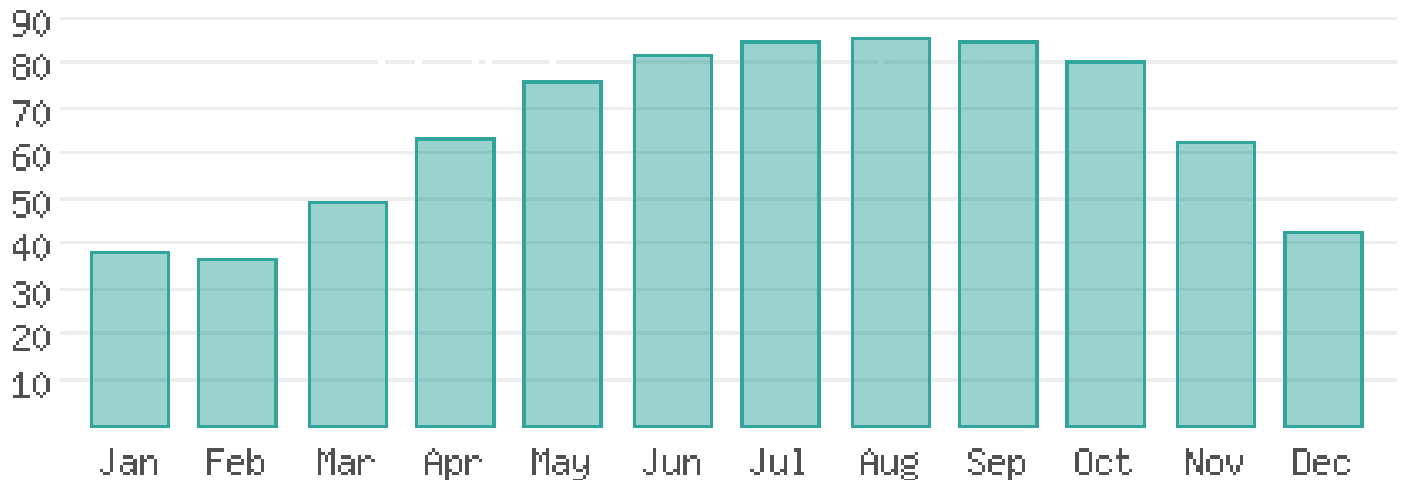
As shown in Figure 4.5, below, the lowest average monthly rainfall was recorded in the month of December (1 mm) while the highest was recorded in the month of August (238 mm).

**Figure 4.5: Average Rainfall Abuja, Nigeria**



### (c) Relative Humidity

As indicated in Figure 4.6, the fluctuation in the temperature is accompanied by fluctuation in the relative humidity that is recorded during day and night. The record shows that the relative humidity of the study area ranges, from 38% (February) to 88% (August) with a mean of 65.9%.



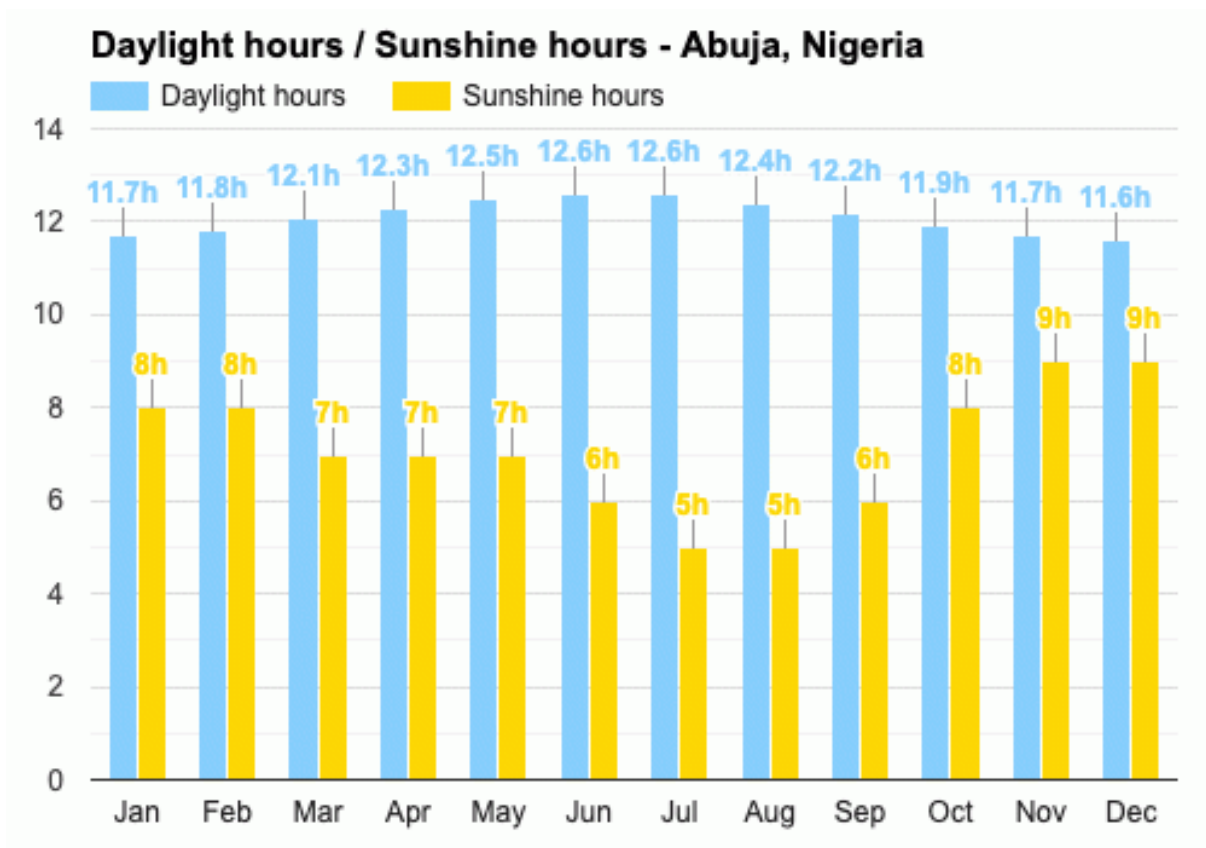
**Figure 4.6: Average Relative Humidity**

### (d) Sunshine

Reading from Figure 4.7, the yellow vertical bars indicate sunshine hours and the blue vertical bars indicate daylight hours.

In the study area, the sunshine hours vary, from a minimum of 5hrs in both July and August to 9hrs in both November and December; and the average sunshine hours, is 7.083hrs.

The daylight hours vary, from a minimum of 11.6hrs in December to 12.6hrs in both June and July; and the average daylight hours, is 12.12hrs.



**Figure 4.7: Average Daylight / Average Sunshine for Abuja**

**(e) Wind Speed**

Wind characteristics, as shown in Table 4.6, are quite variable over the region. Wind speed was generally low usually, less than 10 knots (5.14 m/s) for most periods of the year. The highest wind speed of 9.3 knots (4.78 m/s) occurred in April, while the lowest wind speed of 6.6 knots (3.39 m/s) occurred in November.

**Table 4.6: Abuja Weather by Month - Average Wind Speeds**  
 All wind speeds are in knots. 1 knot = 1.15 MPH or 1.85 KPH.

Month	Avg. Wind	Avg. Wind Feel	Sustained High Wind	High Wind Feel
Jan	4.4	Light breeze	6.9	Light breeze
Feb	4.7	Light breeze	8.1	Gentle breeze
Mar	4.8	Light breeze	8.8	Light breeze
Apr	4.6	Light breeze	9.3	Gentle breeze
May	4.4	Light breeze	8	Light breeze
Jun	4.6	Light breeze	7.7	Gentle breeze
Jul	4.5	Light breeze	7.8	Light breeze
Aug	4.4	Light breeze	8.1	Gentle breeze
Sep	4.3	Light breeze	7.6	Light breeze
Oct	3.9	Barely noticeable	8.4	Gentle breeze
Nov	4	Light breeze	6.6	Light breeze
Dec	4.6	Light breeze	7.2	Gentle breeze

## 4.2.2 Air Quality Study

### 4.2.2.1 Introduction

The atmosphere is one of the four (4) major segments of the environment extending up to about 500Km above the earth surface. It comprises of a mixture of gases, which play important role in sustaining life on earth. The composition of clean, dry air, near sea - level is given in Table 4.7 below and any major disturbance in this atmospheric composition, either by extraordinary or anthropogenic activities, may lead to disastrous consequences, which may endanger the very survival of life on earth.

**TABLE 4.7: COMPOSITION OF CLEAN, DRY AIR, NEAR SEA - LEVEL**

	<b>Components</b>	<b>Content (%)</b>
a.	<b>Major Components</b>	
	Nitrogen (N <sub>2</sub> )	78.09
	Oxygen (O <sub>2</sub> )	20.94
	Water Vapour (H <sub>2</sub> O)	0.1-5
b.	<b>Minor Components</b>	
	Argon (Ar)	0.934
	Carbon dioxide (CO <sub>2</sub> )	0.032
c.	<b>Trace Components</b>	
	Neon (Ne)	0.00182
	Helium (He)	0.000524
	Methane (CH <sub>4</sub> )	0.00018
	Krypton (Kr)	0.00011
	Nitrous oxide (N <sub>2</sub> O)	0.000025
	Hydrogen (H <sub>2</sub> )	0.000025
	Xenon (Xe)	0.00005
	Sulphur dioxide (SO <sub>2</sub> )	0.0000087
	Nitrogen dioxide (NO <sub>2</sub> )	0.0000002
	Ammonia (NH <sub>2</sub> )	0.0000001
	Carbon monoxide (CO)	0.000001
	Ozone (O <sub>3</sub> )	0.00012
	Iodine (I <sub>2</sub> )	0.00002

Sources: Nigeria Meteorological Service, Oshodi

Although various gases, as well as, particulate matters are continually released into the atmosphere through natural activities such as forest fires, volcanic eruptions, decay of vegetation, wind and sandstorms; the magnitude of air pollution such as through CO, CO<sub>2</sub>, H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>x</sub> and Particulate Matter released into the atmosphere from anthropogenic activities surpasses those

contributed by nature over a thousand-fold. This problem has increased alarmingly over the years due to population explosion, industrialization, urbanization, transportation and other human activities.

#### 4.2.2.2 Effects of Air Pollution

Air pollutants are present in the atmosphere in concentration that disturb the dynamic equilibrium in the atmosphere and thereby affect man and his environment. The five (5) major pollutants which together contribute more than 90% of global air pollution are CO, NO<sub>x</sub>, CH, SO<sub>x</sub> and Particulate Matter; and these pollutants are known to affect man and the environment in varied number of ways. For instance, oxides of nitrogen and sulphur have been known to be oxidized to H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub> by various photochemical and catalytic chemical reactions and are eventually washed down with rain as **ACID RAIN**. This acid rain problem has been reported to have caused extensive damage to buildings and structural materials, as well as valuable ancient sculptures. The acidification of soils and aquatic systems have also been reported to alter species composition among planktons, decline in productivity of fish and the remobilization of metals, which were initially locked unto sediment/soil particles. Acidification of drinking water reservoirs and concurrent increases in heavy metal concentrations may exceed public health limits and cause injurious effects.

Apart from the formation of acid rain, the release of excessive concentration of hydrocarbon in the atmosphere from anthropogenic sources may also result in the hydrocarbon being oxidized in the atmosphere by a series of chemical and photochemical reactions resulting in the formation of various end-products such as CO<sub>2</sub> and solid organic compounds and aldehydes. These products from photochemical reactions of hydrocarbon play important roles in the formation of photochemical smog which is characterized by reduced visibility, eye irritation, damage to vegetation and accreted cracking of rubber products. They have also been implicated as a major cause of global warming.

Furthermore, data from human and animal studies indicate that nitrogen oxides have untold effects on human health; in addition, nitrogen oxides can affect vegetation causing acute (chronic) injury to leaves as well as to productivity of certain plants; Nickel alloys are subject to corrosion in the presence of nitrogen oxides; synthetic fibres fade and white clothes yellow in the presence of nitrogen oxides;

Nitrogen Oxides in reaction with hydrocarbon produce photochemical smog, which is source of safety hazard.

Carbon Monoxide – results from incomplete combustion of carbonaceous materials present fuel, etc.

To reduce the discharged volume of “CO” which can seriously endanger life when inhaled, more oxygen (air) is required to combust/oxidize the “CO” to “CO<sub>2</sub>”

Adverse health effects on humans have been observed for exposures of 8 hours or more at a concentration of 12 to 17 mg/m<sup>3</sup> (10 to 15ppm); such adverse effects include “impaired time interval discrimination” physiologic stress on heart patients”, etc.

Particulate Matters in the atmosphere are also known to cause varying deleterious effects in the environment, although it is important to emphasize that the size of the particulates and their chemical constituents are more vital in this regard than their level in the environment. Particulates include Fe<sub>3</sub>O<sub>4</sub>, V<sub>2</sub>O<sub>5</sub>, CaO, PbCl<sub>2</sub>, PbBr<sub>2</sub>, Fly Ash, Aerosols, Soot, Polycyclic Aromatic Hydrocarbon (PAH) dusts, Cement Particulates, etc. PAHs for example are important constituents of several Organic Particulates, which have been found to be carcinogenic.

Soot is also a highly condensed product of PAH compounds and can itself absorb toxic Trace Metals, e. g., Be, Cr, Ni and Cd, as well as Carcinogenic Organics, such as benzo-pyrenes. Fine particulates having size of less than three (3) micro can also penetrate through the nose and throat causing breathing problems and irritation of the lung capillaries.

#### **Air Quality Standard and Need for Background Data before Project Implementation**

In Nigeria, the regulatory agency, Federal Environmental Protection Agency (FEPA), now Federal Ministry of Environment (FMEnv), has developed national interim standards for gaseous emissions against which air quality parameters monitored are judged in order to ascertain its quality. Also working from the above, the National Environmental Standards and Regulations Enforcement Agency (NESREA) has published some guidelines in this direction. Table 4.8 below gives the limits of the Nigerian Ambient air quality standard.

**TABLE 4.8: NIGERIAN AMBIENT AIR QUALITY STANDARD**

<b>Air Pollutants</b>	<b>Limits</b>
Particulates	250 (µg/m <sup>3</sup> )
SO <sub>2</sub>	0.1 (ppm)
Non - Methane HC	160 (µg/m <sup>3</sup> )
CO	11.4 (µg/m <sup>3</sup> )
NO <sub>x</sub>	0.04-0.06 (ppm)
Photochemical Oxidant	0.06 (ppm)

Source: FEPA, 1991

In view of the above - mentioned, the objectives of this aspect of the EIA study on the proposed petroleum products tank farm in the project area are as follows: -

1. Determine the baseline or existing state of air quality within the project area;
2. Identify the possible impacts on air quality that may result from the proposed petroleum products tank farm's construction and operations;
3. Proffer mitigation measures to minimize or eliminate the identified impacts;
4. Prepare a comprehensive Environmental Management Plan (EMP) for the relevant air quality variables.

**TABLE 4.9: CONCENTRATION OF NOXIOUS GASES AND PARTICULATES IN THE AIR SAMPLES, AND ALSO NOISE LEVEL MEASUREMENTS TAKEN AT DIFFERENT STATIONS 1.85KM FROM THE PROPOSED - ONE SEASON 2019**

S/N	SAMPLING POINTS	GEO-COORDINATES	O <sub>2</sub> (%)	NH <sub>3</sub> (ppm)	NO <sub>2</sub> (ppm)	SO <sub>2</sub> (ppm)	CO (ppm)	H <sub>2</sub> S (ppm)	TSP (µgm <sup>3</sup> )	CH <sub>4</sub> (%)	Noise Level (dB(A))
1	A1	N09° 0'6.912" E007° 16'39.144"	20.9	ND	ND	ND	ND	ND	5.9	1.0	40.1
2	A2	N09° 0'10.152" E007° 16'39.54"	20.9	ND	ND	ND	ND	ND	5.5	1.0	57.5
3	A3	N09° 0'8.892" E007° 16'38.892"	20.9	ND	ND	ND	ND	ND	5.8	1.0	48.8
4	A4	N09° 0'7.776" E007° 16'38.244"	20.9	ND	ND	ND	ND	ND	5.9	1.0	41.1
5	A5	N09° 0'5.58" E007° 16'37.236"	20.9	ND	ND	ND	ND	ND	5.9	1.0	42.9
6	A6	N09° 0'4.968" E007° 16'38.136"	20.9	ND	ND	ND	ND	ND	ND	1.0	50.0
7	A7	N09° 0'6.336" E007° 16'37.596"	20.9	ND	ND	ND	ND	ND	70.6	ND	55.3
8	A8	N09° 0'3.78" E007° 16'39.144"	20.9	ND	ND	ND	ND	ND	60.0	ND	56.7
9	A9	N09° 0'8.496" E007° 16'39.0"	20.9	ND	ND	ND	ND	ND	96.1	ND	48.3
											54.3
											61.2
Mean			20.9	ND	ND	ND	ND	ND	28.41	0.67	50.56
Max			20.9	ND	ND	ND	ND	ND	96.1	1.0	61.2
Min			20.9	ND	ND	ND	ND	ND	ND	ND	40.1

Source: Everlink Telesat Network Limited's Proposed Four Star Hotel Project EMP Field data Gathering April 2019

**LEGEND:**

TSP - Total Suspended Particulates;

ND - Not Detected



**TABLE 4.10: COMPARISON OF THE MEAN CONCENTRATIONS OF AIR QUALITY PARAMETERS MEASURED DURING THE FIELD SURVEY (ONE SEASON 2019) TO THE NIGERIAN AMBIENT AIR QUALITY STANDARD**

Parameters	Mean levels (lower - upper Levels)	Nigeria Ambient Air Quality Standard
Particulates ( $\mu\text{gm}^3$ )	28.41 (ND – 96.1)	250
O <sub>2</sub> (%)	20.9 (20.9 – 20.9)	
CH <sub>4</sub> (%)	0.67 (ND – 1.0)	0.008
SO <sub>2</sub> (ppm)	ND (ND - ND)	0.01 - 0.1
CO (ppm)	ND (ND - ND)	10 – 20
NO <sub>2</sub> (ppm)	ND (ND - ND)	0.04 - 0.06
H <sub>2</sub> S (ppm)	ND (ND - ND)	NS
Noise level dB(A)	50.56 (40.1 – 61.2)	90

Source: Everlink Telesat Network Limited's Proposed Four Star Hotel Project EMP Field data Gathering April 2019

**LEGEND:**

NS - Not Specified.

**TABLE 4.11: CONCENTRATION OF NOXIOUS GASES AND PARTICULATES IN THE AIR SAMPLES, AND ALSO NOISE LEVEL MEASUREMENTS TAKEN AT THE DIFFERENT STATIONS DURING THE FIELD SURVEYS - ONE SEASON 2020**

S/N	SAMPLING POINTS	GEO-COORDINATES	O <sub>2</sub> (%)	NO <sub>2</sub> (ppm)	SO <sub>2</sub> (ppm)	CO (ppm)	VOC (ppm)	CO <sub>2</sub> (ppm)	H <sub>2</sub> S (ppm)	TSP (µgm <sup>3</sup> )	CH <sub>4</sub> (%)	Noise Level (dB(A))
1	SP <sub>1</sub>	N08° 59'18.463" E007° 16'16.619"	20.9	0.01		ND	ND	300	ND	0.05	ND	47.9
2	SP <sub>2</sub>	N08° 59'15.9" E007° 16'14.9"										
3	SP <sub>3</sub>	N08° 59'14.391" E007° 16'13.251"	20.9	0.02		ND	ND	305	ND	0.01	ND	50.6
4	SP <sub>4</sub>	N08° 59'12.746" E007° 16'14.581"	20.9	0.04		6	ND	700	ND	0.005	1	50.5
5	SP <sub>5</sub>	N08° 59'14.724" E007° 16'16.554"	20.9	0.03		5	ND	700	ND	0.007	ND	46.6
6	SP <sub>6</sub>	N08° 59'14.64" E007° 16'17.591"	20.9	0.01		4	ND	300	ND	0.003	1	43.9
7	SP <sub>7</sub>	N08° 59'17.275" E007° 16'18.048"	20.9	0.01		2	ND	305	ND	0.006	ND	49.2
8	SP <sub>Control</sub>	N08° 59'14.0" E007° 16'12.5"	20.9	0.04		8	ND	708	ND	0.009	ND	55.6
9												
Mean			20.9	0.023		3.57	ND	474	ND	12.86	0.286	49.19
Max			20.9	0.04		8	ND	708	ND	50	1	55.6
Min			20.9	0.01		ND	ND	300	ND	3	ND	43.9

Source: Field Works (Wet Season), October 2020

**LEGEND:**

TSP - Total Suspended Particulates;

ND - Not Detected

**TABLE 4.12: ELEMENTAL COMPOSITIONS OF PARTICULATES IN AIR SAMPLED AT THE DIFFERENT STATIONS DURING THE FIELD SURVEY – ONE SEASON 2020**

S/N	SAMPLING POINTS	Pb $\mu\text{gm}^3$	Cr $\mu\text{gm}^3$	Hg $\mu\text{gm}^3$	As $\mu\text{gm}^3$	Ni $\mu\text{gm}^3$	Cd $\mu\text{gm}^3$
1	SP <sub>1</sub>	ND	ND	ND	ND	ND	ND
2	SP <sub>2</sub>	-	-	-	-	-	-
3	SP <sub>3</sub>	ND	ND	ND	ND	ND	ND
4	SP <sub>4</sub>	ND	ND	ND	ND	ND	ND
5	SP <sub>5</sub>	ND	ND	ND	ND	ND	ND
6	SP <sub>6</sub>	ND	ND	ND	ND	ND	ND
7	SP <sub>7</sub>	ND	ND	ND	ND	ND	ND
8	SP <sub>Control</sub>	ND	ND	ND	ND	ND	ND

Source: Field Works, October 2020

**LEGEND:**ND - Not Detected at Levels below 0.0001  $\mu\text{gm}^3$ **TABLE 4.13: COMPARISON OF THE MEAN CONCENTRATIONS OF AIR QUALITY PARAMETERS MEASURED DURING THE FIELD SURVEY (ONE SEASON 2020) TO THE NIGERIAN AMBIENT AIR QUALITY STANDARD**

Parameters	Mean levels (lower - upper Levels)	Nigeria Ambient Air Quality Standard
Particulates ( $\mu\text{gm}^3$ )	12.86 (3 – 50)	250
O <sub>2</sub> (%)	20.9 (20.9 – 20.9)	
VOC (ppm)	ND (ND - ND)	
CH <sub>4</sub> (%)	0.286 (ND - 1)	0.008
SO <sub>2</sub> (ppm)		0.01 - 0.1
CO (ppm)	3.57 (ND - 8)	10 – 20
CO <sub>2</sub> (ppm)	474 (300 – 708)	
NO <sub>2</sub> (ppm)	0.023 (0.01 – 0.04)	0.04 - 0.06
H <sub>2</sub> S (ppm)	ND (ND - ND)	NS
Noise level dB(A)	49.19 (43.9 – 55.6)	90

Source: Field Works, October 2020

**LEGEND:**

NS - Not Specified.

4.2.2.3 Tables 4.9 and 4.10 give the results of the ambient air quality measurements during the EMP data gathering (field works) for the proposed Everlink Telesat Network Limited's Four Star Hotel Project, along Nnamdi Azikiwe International Airport, Abuja in April 2019.

Table 4.9 shows: "Concentration of Noxious Gases and Particulates in the Air Samples, and also Noise Level at the different Stations during the Field Surveys"; Table 4.10 shows: "Comparison of the Mean Concentrations of Air Quality Parameters Measured During the Field Survey to the Nigerian Ambient Air Quality Standard.

Tables 4.11 to 4.13 give the results of of the ambient air quality measurements during the EIA data gathering (field works) for the proposed A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) Depot Facility project, within Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT in October 2020.

Table 4.11 shows: "Concentration of Noxious Gases and Particulates in the Air Samples, and also Noise Level at the different Stations during the Field Surveys"; Table 4.12 shows: "Elemental Compositions of Particulates in Air Sampled at the Different Stations During the Field Surveys"; and, Table 4.13 shows: "Comparison of the Mean Concentrations of Air Quality Parameters Measured During the Field Survey to the Nigerian Ambient Air Quality Standard.

From the results obtained, it can be seen that Mean Levels of the following parameters tested for: CH<sub>4</sub>, SO<sub>2</sub>, NO<sub>2</sub>, NO<sub>x</sub>, and HC did fall within Nigerian Ambient Air Quality Standards.



**Plate 4.1: Photo Taken During Air Quality Measurement Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**



**Plate 4.2: Photo Taken During Air Quality Measurement Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**

### 4.2.3 Water Quality Studies

Water quality studies constitute one of the most important components in any EIA study. The importance attached to this component is due to the various uses that the water bodies in any project area are being put to. In most cases, the water bodies constitute a means of livelihood to many inhabitants of the neighbouring community. Therefore, it is important to always investigate the possible impacts that a developmental activity might have on the water quality before implementation. The result of the water quality studies during the sampling survey are presented in Tables 4.14 to 4.16.

#### Ground Water

##### Groundwater Conditions

Groundwater was generally encountered across / within the site and depth investigated at about -1.00m to -4.00m depth. Noted was the variation in the groundwater levels across the site.

We, therefore, anticipate seasonal variation of the groundwater level.

##### Groundwater Samples

The ground water samples were collected from the boreholes sunk within the premises of the proposed project (Table 4.15 gives the analyses results of ground water samples taken for the proposed A. A. Rano Nigeria Ltd's ATK Depot project EIA in October 2020).

In addition, the Groundwater Sample's Analysis Results from the EMP of the proposed Everlink Telesat Network Limited's Four-Star Hotel Project, along Nnamdi Azikiwe International Airport, Abuja in April 2019 (already referenced), which is about 1.85km from the proposed project site, is shown in Table 4.14, of this chapter of the report.

The results revealed that the pH of the water, though within set limit, was ranging between mild acidity and neutrality with values range of 6.8 to 7.4, for both sites, but with Phosphate being high in the 2019 sample while both Phosphate and Nitrate are high in only one of the two samples for 2020, as indicated in tables 4.14 to 4.15.

The heavy metal analyses of the water samples showed that the levels of metals in the water were generally low and, in most cases, not detectable, except for Magnesium, which was relatively high in both the samples for 2019 and 2020.

With respect to the microbiological parameters of the water samples, the Total Plate Count was found to higher than government set limit, while the presence of coliform, Salmonella and Ent. Aerogenes, was confirmed in some of the samples for both 2019 and 2020 data gathering exercises.

**TABLE: 4.14: RESULTS OF GROUND WATER ANALYSES TAKEN AT DIFFERENT STATION 1.85KM FROM THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT FACILITY SITE COMPARED AGAINST REGULATORY STANDARDS - ONE SEASON 2019**

ITEM NO	PARAMETERS	UNITS	READINGS	FMENV STANDARDS	DPR STANDARDS
			GW <sub>3</sub>		
<b>A</b>	<b>PHYSICAL</b>				
1.	Colour	pt. Co. APHA	5	250	
2.	Appearance			Clear	
3.	Turbidity	FTU			10
4.	Odour		Unobjectionable	Odourless	
5.	Temperature	°C	29.1	35-40	30
6.	pH		6.8	6-8	6.5-8.5
7.	Total Solids (TS)	ppm		2200	
8.	Total Suspended Solids (TSS)	"	3.5	100	<2000
9.	Total Dissolved Solids (TDS)	"	156	2100	
10.	Conductivity	µs/cm	313		
<b>B.</b>	<b>CHEMICAL</b>				
11.	Total Acidity	ppm		NS	
12.	Total Alkalinity	"		NS	
13.	Chloride	"	28.7	250	
14.	Total Hardness (CaCO <sub>3</sub> )	"	68.48	200	
15.	Nitrate (NO <sub>3</sub> )	"	8.03	10	
16.	Nitrite	"	0.05	<1	
17.	Phosphate	"	1.32	0.2	
18.	Phenol	"	0.03	50	
19.	Dissolved Oxygen (DO)	"	8.03	Not less than 2	
20.	Sulphate	"	27.39	500	
21.	Oil and Grease	"	0.16	10	
22.	Chemical Oxygen Demand (COD)	"	23.5	200	
23.	Biochemical Oxygen Demand (BOD)	"	7.0	50	
24.	Total Petroleum Hydrocarbon (TPH)	"		15	
25.	BTEX	"		1	
26.	PAH	"		NS	
<b>C</b>	<b>TOXIC &amp; HEAVY METALS</b>				
27.	Calcium	ppm	51.36	200	
28.	Magnesium	"	17.12	5.0	
29.	Copper	"	0.35	5.0	
30.	Iron	"	0.56	< 1.0	
31.	Chromium	"	0.015	10 0	
32.	Sodium	"		1.0	0.03
33.	Cobalt	"		< 1.0	
34.	Manganese	"	0.043		
35.	Zinc	"	0.81	5.0	
36.	Potassium	"		0.1	
37.	Nickel	"	ND	2.0	
38.	Lead	"		200	
39.	Cadmium	"	0.02	3.0	
40.	Silver	"		< 0.01	
41.	Mercury	"		0.01	
<b>D</b>	<b>MICROBIOLOGICAL</b>				
42.	Total Plate Count			350	
43.	Presence of Coliform (MCA)			Nil/Negative	
44.	Total Chloroform Count	MPN/100ml	520	150	
45.	Confirmation Test for Faecal Coliform (EMB)	"NIL		Nil/Negative	
46.	Fecal coliform count	Cfu/100ml			

47.	E-Coli Count	“	-ve	Nil	
48.	Salmonella	“	+ve		
49.	Shigella	“	-ve		
50.	Staphilococcus	“			
51.	Ent. Aerogenes	“	+ve		

Source: Everlink Telesat Network Limited's Proposed Four Star Hotel Project EMP Field data Gathering April 2019

 Parameters out of Compliance

 Set Standards by Government

**LEGEND:** ND- Not Detectable; NS – Not Stated; NA –Not Analyzed; °C – Degree Celsius; Mg/l- Milligrams per Litre; MPN/100ml- Most Probable Number per Hundred Millilitres; Pt. Co. APHA – Platinum Cobalt APHA Method

**TABLE: 4.15: RESULTS OF GROUND WATER ANALYSES AT THE SITE OF THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT FACILITY SITE COMPARED AGAINST REGULATORY STANDARDS - ONE SEASON 2020**

ITEM NO	PARAMETERS	UNITS	READINGS		FMENV STANDARDS	DPR STANDARDS
			GW <sub>1</sub>	GW <sub>2</sub>		
<b>A</b>	<b>PHYSICAL</b>					
1.	Colour	pt. Co. APHA			250	
2.	Appearance		Brown	Clear	Clear	
3.	Turbidity	FTU				10
4.	Odour		Unobjectionable	Unobjectionable	Odourless	
5.	Temperature	°C	31.8	32.1	35-40	30
6.	pH		7.4	6.8	6-8	6.5-8.5
7.	Total Solids (TS)	ppm			2200	
8.	Total Suspended Solids (TSS)	“	1.112	0.701	100	<2000
9.	Total Dissolved Solids (TDS)	“	32	89.0	2100	
10.	Conductivity	µs/cm	58	172		
<b>B.</b>	<b>CHEMICAL</b>					
11.	Total Acidity	ppm			NS	
12.	Total Alkalinity	“			NS	
13.	Chloride	“			250	
14.	Total Hardness (CaCO <sub>3</sub> )	“	102.72	1.2.72	200	
15.	Nitrate (NO <sub>3</sub> )	“	15.34	1.77	10	
16.	Nitrite	“	0.432	0.122	<1	
17.	Phosphate	“	0.623	0.055	0.2	
18.	Phenol	“			50	
19.	Dissolved Oxygen (DO)	“	4.86	7.35	Not less than 2	
20.	Sulphate	“	23.2	7.8	500	
21.	Oil and Grease	“			10	
22.	Chemical Oxygen Demand (COD)	“	43.2	27	200	
23.	Biochemical Oxygen Demand (BOD)	“	12.4	7.3	50	
24.	Total Petroleum Hydrocarbon (TPH)	“			15	
25.	BTEX	“			1	
26.	PAH	“			NS	
<b>C</b>	<b>TOXIC &amp; HEAVY METALS</b>					
27.	Calcium	ppm	136.96	154.08	200	
28.	Magnesium	“	34.24	51.36	5.0	
29.	Copper	“	0.999	0.037	5.0	
30.	Iron	“	0.938	0.070	< 1.0	
31.	Chromium	“			10 0	
32.	Sodium	“			1.0	0.03
33.	Cobalt	“			< 1.0	
34.	Manganese	“	0.340	Nil		
35.	Zinc	“	1.012	0.016	5.0	
36.	Potassium	“			0.1	

37.	Nickel	“	0.390	Nil	2.0	
38.	Lead	“	0.039	Nil	200	
39.	Cadmium	“	0.082	Nil	3.0	
40.	Silver	“			< 0.01	
41.	Mercury	“			0.01	
<b>D</b>	<b>MICROBIOLOGICAL</b>					
42.	Total Plate Count				350	
43.	Presence of Coliform (MCA)				Nil/Negative	
44.	Total Chloroform Count	MPN/100ml	280	Nil	150	
45.	Confirmation Test for Feecal Coliform (EMB)	“NIL			Negative	
46.	Fecal coliform count	Cfu/100ml	3400	Nol		
47.	E-Coli Count	“	230000	Nil	Nil	
48.	Salmonella	“	25000	Nil		
49.	Shigella	“	260	Nil		
50.	Staphilococcus	“	120	Nil		
51.	Ent. Aerogenes	“				

Source: Field Works, October 2020

Parameters out of Compliance

Set Standards by Government

**LEGEND:** ND- Not Detectable; NS – Not Stated; NA –Not Analyzed; °C – Degree Celsius; Mg/l- Milligrams per Litre; MPN/100ml- Most Probable Number per Hundred Millilitres; Pt. Co. APHA – Platinum Cobalt APHA Method

Based on the results obtained in Tables 4.14 and 4.15, it can be safely stated that using the data, there is the clear indication that parameters or the attributes considered fall within the same range.



**Plate 4.3: Photo Taken During Ground Water Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd’s ATK Depot Site at Aviation Village, Abuja FCT – October 2020**



**Plate 4.4: Photo Taken During Ground Water Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd’s ATK Depot Site at Aviation Village, Abuja FCT – October 2020**



## Surface Water

The surface water sample was collected at a shallow slow flowing stream, which flows westwards and is located about 800 metres on the southern axis of the proposed project site.

The analysis result of the surface water sample collected in October 2020 is contained in Table 4.16, below.

The results of the parameters tested for in Table 4.16 indicate that the pH of the stream water body is within neutrality, with a value of 7.2.

Both the Phosphate and Nitrate are higher than the respectively set government limits.

The heavy metal analyses of the water samples showed that the levels of metals in the water were generally low and, in some cases, not detectable, except for Magnesium, which was higher than set limit.

With respect to the microbiological parameters of the water samples, the Total Plate Count was found to higher than government set limit, while the presence of coliform, Salmonella and Ent. Aerogenes, was confirmed in the analysed water sample.

**TABLE: 4.16: RESULTS OF SURFACE WATER ANALYSES TAKEN AT NEARBY STREAM (800M SOUTH) OF THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT FACILITY SITE COMPARED AGAINST REGULATORY STANDARDS - ONE SEASON 2020**

ITEM NO	PARAMETERS	UNITS	READINGS	FMENV STANDARDS	DPR STANDARDS
			SW <sub>1</sub>		
<b>A</b>	<b>PHYSICAL</b>				
1.	Colour	pt. Co. APHA		250	
2.	Appearance		Clear	Clear	
3.	Turbidity	FTU			10
4.	Odour		Unobjectionable	Odourless	
5.	Temperature	° C	31.1	35-40	30
6.	pH		7.2	6-8	6.5-8.5
7.	Total Solids (TS)	ppm	78	2200	
8.	Total Suspended Solids (TSS)	"	0.501	100	<2000
9.	Total Dissolved Solids (TDS)	"	41	2100	
10.	Conductivity	us/cm			
<b>B.</b>	<b>CHEMICAL</b>				
11.	Total Acidity	ppm		NS	
12.	Total Alkalinity	"		NS	
13.	Chloride	"		250	
14.	Total Hardness (CaCO <sub>3</sub> )	"	17.12	200	
15.	Nitrate (NO <sub>3</sub> )	"	12.0	10	
16.	Nitrite	"	0.033	<1	
17.	Phosphate	"	0.015	0.2	
18.	Phenol	"		50	
19.	Dissolved Oxygen (DO)	"	8.44	Not less than 2	
20.	Sulphate	"	13.3	500	
21.	Oil and Grease	"		10	
22.	Chemical Oxygen Demand (COD)	"	120	200	
23.	Biochemical Oxygen Demand (BOD)	"	40	50	
24.	Total Petroleum Hydrocarbon (TPH)	"		15	
25.	BTEX	"		1	
26.	PAH	"		NS	
<b>C</b>	<b>TOXIC &amp; HEAVY METALS</b>				
27.	Calcium	ppm	51.36	200	
28.	Magnesium	"	34.24	5.0	
29.	Copper	"	0.0335	5.0	

30.	Iron	“	0.300	< 1.0	
31.	Chromium	“		10 0	
32.	Sodium	“		1.0	0.03
33.	Cobalt	“		< 1.0	
34.	Manganese	“	0.330		
35.	Zinc	“	1.125	5.0	
36.	Potassium	“		0.1	
37.	Nickel	“	0.051	2.0	
38.	Lead	“	0.080	200	
39.	Cadmium	“	0.0006	3.0	
40.	Silver	“		< 0.01	
41.	Mercury	“		0.01	
<b>D</b>	<b>MICROBIOLOGICAL</b>				
42.	Total Plate Count		1600	350	
43.	Presence of Coliform (MCA)			Nil/Negative	
44.	Total Chloroform Count	MPN/100ml		150	
45.	Confirmation Test for Faecal Coliform (EMB)	“NIL		Nil/Negative	
46.	Fecal coliform count	Cfu/100ml	520	Nil	
47.	E-Coli Count	“	180		
48.	Salmonella	“	150		
49.	Shigella	“	80		
50.	Staphilococcus	“	220		
51.	Ent. Aerogenes	“			

Source: Field Works, October 2020

Parameters out of Compliance

Set Standards by Government

**LEGEND:** ND- Not Detectable; NS – Not Stated; NA –Not Analyzed; °C – Degree Celsius; Mg/l- Milligrams per Litre; MPN/100ml- Most Probable Number per Hundred Millilitres; Pt. Co. APHA – Platinum Cobalt APHA Method



**Plate 4.5: Photo Taken During Surface Water Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**



**Plate 4.6: Photo Taken During Surface Water Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**

## 4.2.4 TOPOGRAPHY, GEOLOGY AND SOILS

### 4.2.4-1 Topography:

The topography of Abuja is undulating with hills and inselbergs that rise northwestwards to a maximum of 1,060 metres above sea level. There are extensive plains found between hills in the study area. The Zuma rock stands out clearly on its own as the most conspicuous Inselberg at the boundary of the Abuja with Niger State. The lowest elevations are in the southwestern flood plains of the River Gurara, about 76 metres above sea level. The rivers rise from the hills in the northeast and flow to the southwest. The area is drained by many rivers in and around Abuja including Rivers Gwagwalada and Usmanu, while Rivers Wupa, Wosika and other smaller seasonal southerly-flowing streams form the tributaries and drain the study area. The drainage pattern generally varies from trellis to dendritic.

The major rivers join at Nyimbo village to form a tributary of River Niger in the south. These rivers depend on rainfall for their recharge. As such, their stages are high in rainy season and decrease drastically during the dry season.

### 4.2.4-2 Geology:

The geology and hydrogeology of the study area has been described by many workers, including Ajibade (1976), Grant (1978), McCurry (1985) and Ajibade and Woakes (1983). The study area is underlain by Precambrian rocks of the Nigerian Basement Complex which cover about 85 % of the land surface and cretaceous sedimentary rocks belonging to the Bida Basin which cover the remaining 15 %. From a geological mapping carried out (M. A. Dan-Hassan (2012), P. I. Olasehinde (2012) and J. Yisa (2012)), the major lithologic units found are: migmatite-gneiss; older granites; Meta-sediments (mainly schist, phyllite and quartzite) and Bida sandstones.

In general, the rocks are highly sheared (Kogbe, 1978). The rocks of the area can be divided into four major groups, as follows:

- 1) **Metamorphosed Supracrustal (Exogenetic) Rocks:** Mica Schist (sh), Marble (m), Amphibolite and Amphibole Schist (a), Fine - Medium Grained Gneiss.
- 2) **Migmatitic Complex:** Migmatite (mi), Migmatitic Gneiss (mg), Granite Gneiss (gg), Porphyroblastic Granite Gneiss, Leucocratic Granite Gneiss. Intrusive Granite Coarse Grained Granite.
- 3) **Minor Intrusions:** Rhyolites, Quartz Feldspar Porphyry, Dacatitea and Anddesites, Dolerites and Basalts.
- 4) **Other Formations:** Quartzite, Pegmatite, Quartz vein.

Figure 4.8 below shows the geological map of FCT Abuja.

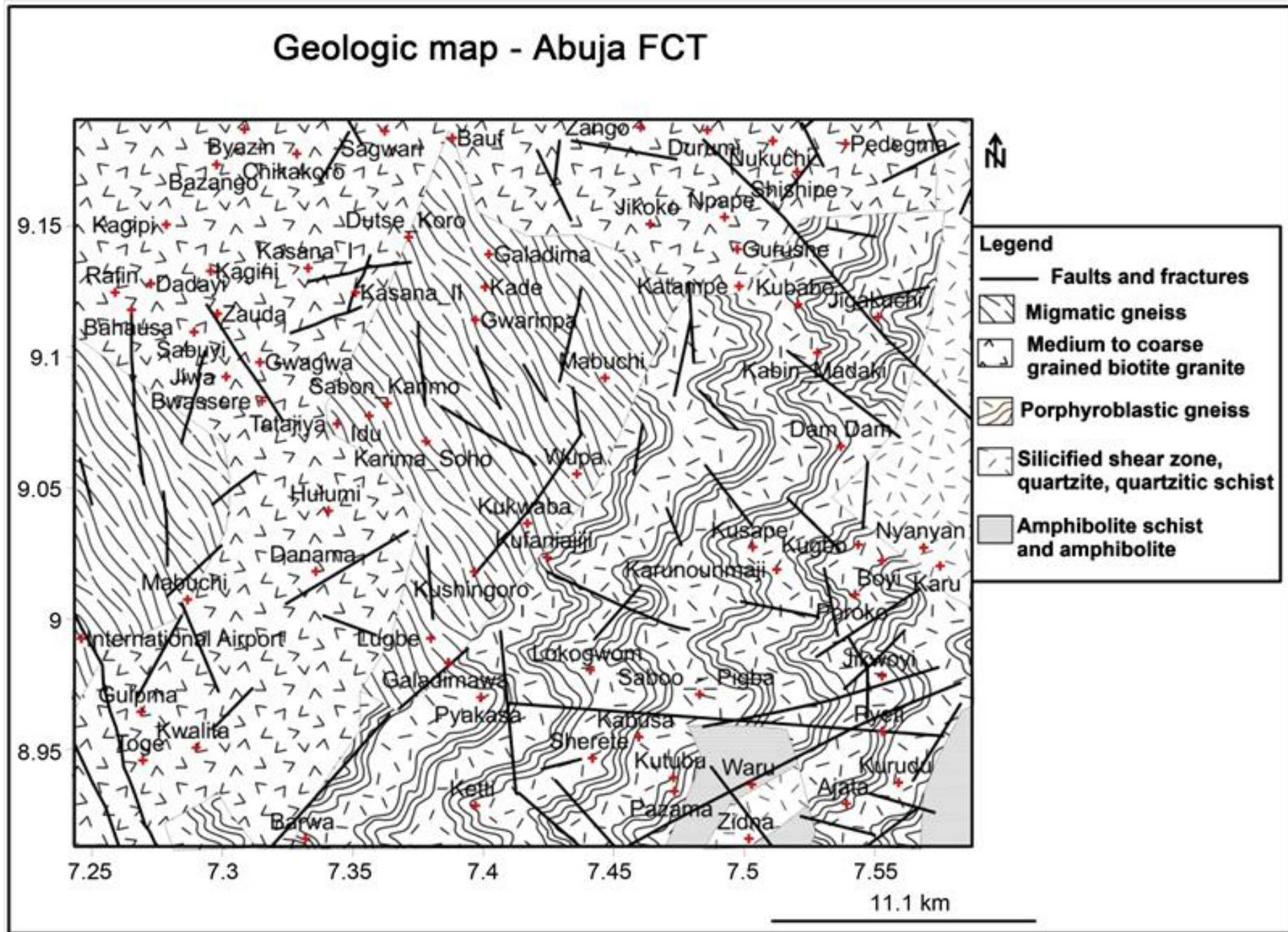


Figure 4.8: Geological Map of Federal Capital Territory (FCT), Abuja

#### 4.2.4-3 Soil:

The soil formation in the study area, is mainly lateritic soil with intermix of cohesive and granular material encountered on the site within the test area and depth investigated. The material encountered also generally includes decompose (weathered quartzite) / sandy intercalation with some mica and rock fragments.

The subsoil condition on the site is fairly uniform. There are, however, some variations in soil consistency and layer thickness / boundaries at the different tests points.

Nevertheless, a concise general description of the subsoil profile established from the tests carried out is given below.

From the existing ground surface to about -0.25m depth, is a layer of generally loose dark to light brown silty fine medium **Sand** with plant roots (topsoil). Cone qc end resistance values for this layer ranges from 3 to 30kg/cm<sup>2</sup>.

From about 0.75m to about -2.25m/-3.00m depth, is a layer of medium dense to becoming dense / firm to stiff brown lateritic silty clayey **Sand** / sandy **Clay**. Cone qc end resistance values for this layer ranges from 1 to 320kg/cm<sup>2</sup>. SPT N-values for this material range from 23 to 29.

From about -2.25m/-3.00m to about -5.25/6.00m depth, is made up of medium dense / stiff brown to reddish brown and yellow lateritic gravelly coarse **Sand** / silty sandy **Clay** with rock fragments in the area of BH3 terminating at -3.00m depth. Within this layer in the area of BH2 is a band of lateritic medium coarse gravel Sand at between -3.00m to -3.75m depth. Cone qc end resistance values for this layer ranges from 33 to 300kg/cm<sup>2</sup>. SPT N-values for this material range from 20 to 25.

Cohesion values for this material taken at -4.5m depth in BH2 is 95KN/m<sup>2</sup> while the angle of internal friction 15.

From -5.25m/-6.00 to the depth of termination of the furthest borehole test at -15.00m depth consists of medium dense/stiff to very stiff greyish to light brown mostly decompose medium coarse Sand with mica/silty sandy Clay with mica and decompose silty clayey sand/sandy clay. In BH1, this layer terminates in fresh rock at -9.75m depth. SPT N-values for this material range from 14 to 22.

Note, the penetrometer test indicates that in place within the site are areas of very loose / soft layer at the upper -1.50m depth.

The Geotechnical Soil Investigation Report of the study area is attached as appendix to this report.

#### 4.2.4-8 The Soil Analyses

The results of analyses of soil of the project area are shown in Tables 4.17 and 4.18, below. Soil texture was found to be varied in composition between sandy to clayey with some silt.

Table 4.17 gives the soil samples' analyses results from the EMP of the proposed Everlink Telesat Network Limited's Four-Star Hotel Project, along Nnamdi Azikiwe International Airport, Abuja in April 2019 (already referenced), which is about 1.85km from the proposed project site.

Table 4.18 gives the soil samples' analyses results the premises of the proposed A. A. Rano Nigeria Ltd's ATK Depot project at Aviation Village, along Nnamdi Azikiwe International Airport, Abuja, EIA, in October 2020.

Soil pH ranged from acidity to alkalinity (6.4 to 6.8 from Table 4.17 (6 samples) and 6.2 to 8.4 from Table 4.18 (7 samples)).

Percent Organic Content figures were found to be low for soil samples for both sites, but the Heavy Metals Contents in the samples were found in low concentrations in the soils of the study areas except for Fe and Zn in the samples collected from the proposed ATK depot site.

Although heavy metals are naturally present in the soil, geologic and anthropogenic activities increase the concentration of these elements to amounts that are harmful to both plants and animals. Some of these activities include mining and smelting of metals, burning of fossil fuels, use of fertilizers and pesticides in agriculture, production of batteries and other metal products in industries, sewage sludge, and municipal waste disposal.

Heavy metals are elements that exhibit metallic properties such as ductility, malleability, conductivity, cation stability, and ligand specificity. They are characterized by relatively high density and high relative atomic weight with an atomic number greater than 20. Some heavy metals such as Co, Cu, Fe, Mn, Mo, Ni, V, and Zn are required in minute quantities by organisms. However, excessive amounts of these elements can become harmful to organisms. Other heavy metals such as Pb, Cd, Hg, and as (a metalloid but generally referred to as a heavy metal) do not have any beneficial effect on organisms and are thus regarded as the "main threats" since they are very harmful to both plants and animals.

Therefore, the need to avoid heavy metal pollution of soils cannot be overemphasized.

The results of soil microbiology of the proposed project area as shown in the Tables 4.18 indicate a very high count recorded for all the sampling stations for heterotrophic and the hydrocarbon utilizing bacteria. This is an indication of some degree of pollution of the soil.

**TABLE 4.17: RESULTS OF SOIL ANALYSES TAKEN AT DIFFERENT STATION 1.85KM FROM THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT FACILITY SITE COMPARED AGAINST REGULATORY STANDARDS - ONE SEASON 2019**

ITEM NO	PARAMETERS	UNITS	READINGS						WHO STANDARDS
			S1	S2	S3	S4	S5	S6	
<b>A</b>	<b>PHYSICAL</b>								
1.	Appearance								
2.	Colour		Light Brown	Yellowish Brown	Reddish Brown	Reddish Brown	Brown	Light Brown	NS
3.	Conductivity	ms/cm							0.1
4.	Temperature	°C							35-40
5.	pH		6.4	6.4	6.4	6.4	6.8	6.4	6-8
6.	Moisture content	%	0.04	0.07	0.06	0.05	0.07	0.04	25
7.	Odour								Odourless
8.	% Sand		47.78	50.24	38.34	44.6	35.82	47.78	NS
9.	% Silt		19.6	18.52	26.68	18.22	22.58	19.6	
10.	% Clay		32.62	31.24	34.98	37.18	41.6	32.62	
11.	Porosity	(%)	33.33	23.33	28.33	26.66	25.0	33.33	NS
12.	Bulk Density	(g/dm <sup>3</sup> )	1.39	1.46	1.42	1.15	1.35	1.39	NS
<b>B</b>	<b>CHEMICAL</b>								
13.	Nitrate (NO <sub>3</sub> )	mg/kg							250
14.	Phosphate (PO <sub>4</sub> <sup>3-</sup> )	“	5.0	10.7	9.8	15.6	10.1	5.0	150
15.	Sulphate	“	63.2	93.9	69.3	76.5	44.1	63.2	300
16.	% Total Organic Carbon (TOC)		0.88	0.86	1.03	0.95	1.82	0.88	NS
17.	Nitrogen Monoxide (NO-)	mg/kg							
18.	Oil and Grease	“	0.57	0.93	0.06	0.88	0.91	0.57	10
19.	Ammonia (NH <sub>3</sub> )	“							
20.	Phosphorus (P)								
21.	Nitrogen (N)		0.41	0.33	1.50	1.17	0.41	0.41	
22.	Chloride (Cl <sup>-</sup> )		10.0	49.35	26.3	22.62	9.05	10.0	600
23.	Nitrite		0.73	0.49	0.38	0.050	0.130	0.73	<1
<b>C</b>	<b>TRACE/TOXIC &amp; HEAVY METALS</b>								
24.	Zinc (Zn)	“	0.09	0.04	0.07	0.04	0.30	0.09	<1
25.	Iron (Fe)	“	0.03	0.45	0.08	0.02	0.30	0.03	5
26.	Chromium (Cr)	“	0.305	0.043	0.060	0.010	0.02	0.305	50
27.	Copper (Cu <sup>2+</sup> )	“	0.12	0.86	1.22	0.44	0.55	0.12	
28.	Magnesium (Mg <sup>2+</sup> )	“	8.09	6.11	6.81	9.52	6.98	8.09	500
29.	Calcium (Ca <sup>2+</sup> )	“	15.36	3.38	4.75	5.07	3.41	15.36	2500
30.	Potassium (K <sup>+</sup> )	“	4.61	2.64	3.13	2.05	5.81	4.61	725
31.	Lead (Pb)		0.003	0.001	0.009	0.007	0.009	0.003	
32.	Cadmium (Cd)								
33.	Arsenic (As)								
34.	Nickel (Ni)		0.02	0.016	ND	0.002	0.006	0.02	
35.	Barium		0.004	0.006	0.03	0.03	0.03	0.004	<1

Source: Everlink Telesat Network Limited's Proposed Four Star Hotel Project EMP Field data Gathering April 2019



Parameters out of Compliance



Set Standards by Government

**LEGEND :** ND- Not Detectable; NS – Not Stated; NA –Not Analyzed; °C – Degree Celsius  
mg/kg - Milligrams per Kilogramme

**TABLE4.18: RESULTS OF SOIL ANALYSES AT THE SITE OF THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT FACILITY SITE COMPARED AGAINST REGULATORY STANDARDS - ONE SEASON 2020**

ITEM NO.	PARAMETERS	UNITS	READINGS							WHO STANDARDS
			SP <sub>1</sub>	SP <sub>2</sub>	SP <sub>3</sub>	SP <sub>4</sub>	SP <sub>5</sub>	SP <sub>6</sub>	SP <sub>7</sub>	
<b>A</b>	<b>PHYSICAL</b>									
1.	pH		8.4	7.8	8.2	6.3	7.4	6.2	8.4	6-8
2.	Moisture content	%	17.81	13.68	11.94	15.72	11.98	13.87	12.71	25
3.	Odour									Odourless
4.	% Sand		34.99	34.84	38.02	35.52	49.66	48.48	50.36	NS
5.	% Silt		23.97	18.68	15.58	17.94	13.22	14.82	10.57	
6.	% Clay		39.25	45.00	46.09	46.29	37.12	34.33	38.16	
7.	Porosity	(%)	33.00	34.33	36.00	36.66	33.66	33.33	33.33	NS
8.	Bulk Density	(g/dm <sup>3</sup> )	0.55	0.57	0.56	0.56	0.58	0.57	0.59	NS
<b>B</b>	<b>CHEMICAL</b>									
9.	Nitrate (NO <sub>3</sub> )	mg/kg	2.53	2.98	2.56	1.95	3.97	3.27	1.34	250
10.	Phosphate (PO <sub>4</sub> <sup>3-</sup> )	“	1.599	2.098	2.493	1.224	2.46	2.08	3.827	150
11.	Sulphate	“	100	100	100	84.4	0.93	76.7	88.0	300
12.	% Total Organic Carbon (TOC)		0.12	0.09	0.05	0.05	0.06	0.04	0.08	NS
13.	Nitrogen Dioxide (NO <sub>2</sub> )	mg/kg								
14.	Oil and Grease	“								10
15.	Ammonium (NH <sub>4</sub> )	“								
16.	Phosphorus (P)	“								
17.	Nitrogen (N)	“								
18.	Chloride (Cl <sup>-</sup> )	“	29.95	23.74	17.42	16.11	16.39	11.43	13.03	
19.	Nitrite	“	0.264	0.323	0.303	0.657	0.864	0.952	0.250	
<b>C</b>	<b>TRACE/TOXIC &amp; HEAVY METALS</b>									
20.	Zinc (Zn)	“	4.2	2.9	2.51	1.99	2.34	2.85	3.89	<1
21.	Iron (Fe)	“	18.4	22.23	30.1	10.6	13.1	12.8	14.3	5
22.	Chromium (Cr)	“								50
23.	Copper (Cu <sup>2+</sup> )	“	0.62	1.00	1.2	0.87	0.204	0.101	0.016	
24.	Magnesium (Mg <sup>2+</sup> )	“								500
25.	Calcium (Ca <sup>2+</sup> )	“								2500
26.	Potassium (K <sup>+</sup> )	“								725
27.	Lead (Pb)	“	0.08	1.10	0.10	1.8	0.75	0.70	0.88	
28.	Cadmium (Cd)	“	1.06	0.78	1.03	0.054	0.801	0.100	1.42	
29.	Manganese (Mn)	“	1.1	1.9	3.8	1.6	3.82	3.0	6.3	
30.	Nickel (Ni)	“	0.04	1.23	0.29	0.78	0.39	0.46	0.81	
<b>D</b>	<b>MICROBIOLOGICAL</b>									
31.	E. coli		800	500	900	500	700	700	600	
32.	Staphylococcus		270	290	170	4000	230	160	2000	
33.	Streptococci		4000	4300	4000	4400	3600	3900	4100	
34.	Yeast & mold		1100	1800	1200	1000	2500	1900	4900	

Source: Field Works, October 2020

Parameters out of Compliance
  Set Standards by Government

**LEGEND:** ND- Not Detectable; NS – Not Stated; NA –Not Analyzed; °C – Degree Celsius; mg/kg – Milligrams per Kilogramme





**Plate 4.7: Photo Taken During Soil Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**



**Plate 4.8: Photo Taken During Soil Sampling Exercise at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT – October 2020**

#### 4.2.5 LAND USE PATTERNS

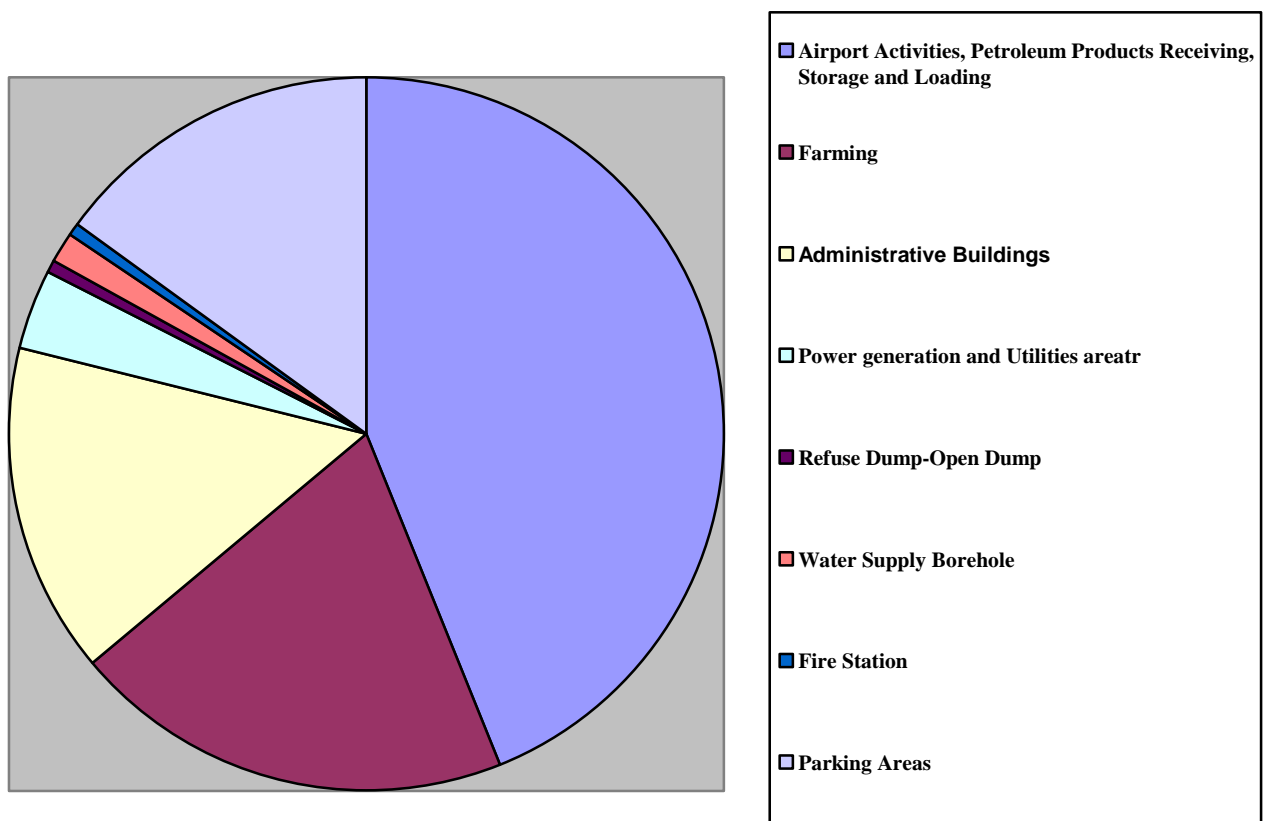
4.2.5-1 Vink, 1975; described land use as a set of technological and biological activities engaged in for economic and social purposes. These activities, to be further explained are directed towards the management and improvement of land resources.

4.2.5-2 Land use, therefore, is defined as any kind of permanent or cyclic human intervention with the land to satisfy human needs. It is the application of human control on natural ecosystem in a relatively systematic manner in order to derive benefit from it.

4.2.5-3 Land use data are required in the analysis of environmental process and problems that must be understood if living conditions and standards are to be improved or maintained at correct levels.

4.2.5-4 In the area under study, the land use is described using the format of Anderson *et al*, 1984 who described land use at three levels. The three levels are levels 1, 11 and 111. Level 1 is the major land use; level 11 is a division of the major while level 111 is the sub-division.

See Figure 4.9 and Table 4.19: Land Use and Land Cover Classification System.



**Figure 4.9: Pie Chart of the Percent (%) Land Use Pattern at the Proposed A. A. Rano Nigeria Ltd's ATK Depot Site at Aviation Village, Abuja FCT**

**TABLE 4.19: LAND USE AND LAND COVER CLASSIFICATION SYSTEM**

S/No.	Level I	Level II	Level III
		<b>Coverage</b>	
1.	<b>Built-up</b>	<b>Commercial and Services</b>	i. Airport Activities, Petroleum Products Receiving, Storage and Loading 44% ii. Farming - 20% iii. Administrative Buildings 15%
2.	<b>Built-up</b>	<b>Communications and Utilities</b>	i. Power generation and Utilities area 3.5% ii. Refuse Dump-Open Dump 0.5% iii. Water Supply Borehole 1.5% iv. Fire Station 0.5%
3.	<b>Built-up</b>	<b>Transportation</b>	i. Parking Areas 15%

#### 4.2.6 ECOLOGY

4.2.6-1 The nature of man's environment is intimately related to the non-human ecology (the study of the interrelationships between organisms and their environment) that surrounds him.

4.2.6-2 Things that affect lower-level elements in the ecological system may ultimately affect man. For instance, the accumulation of pesticides and heavy metals in lower levels of these materials in man. It is worthy to note that the total ecological balance of the environment is crucial to the viability of man in spite of progress that man has so far made in providing for his needs. Consequently, species diversity and balance should be maintained as convincing evidence exists that species diversity in an ecosystem is closely related to the stability of that system, with increasing species diversity indicating an increased ability of the ecosystem to resist disturbance and stress.

4.2.6-3 Therefore, in evaluating the impacts on a given ecological system, an assessment of the effect of proposed alterations of the environment on special field studies, is essential.

Assessing the present setting based on:

1. Habit;
2. Diversity; and
3. Endangered species;

**From the survey carried out, it is safe so say that the proposed project site is not a habitat for endangered species**

#### 4.2.6-4 VEGETATION

##### Introduction

Abuja, FCT, falls within the Guinea 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 southern parts of the territory, where a landscape of gullies and rough terrain is found. These areas of the 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, which are: *Park or Grassy Savannah, Savannah Woodland and Shrub Savannah.*

Park or Grassy Savannah occupies about 15% of the total FCT area. It is annual in nature and only a few trees are found among the grasses such as: *Albiza, Zygia, Butrospermum paradoxum, Daniellia olively and parkia clapperfoniana.*

The savannah woodland occupies about 12.85 % of the total FCT 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 here include: *Afzela hen africana, Anogeissus leicarpus, the Buttyroscarpus paradoxum, Daniellia tive oliveri, Kyaya senegalensis, Prosopis rigi africana, Uapaca tonoensis, Albiza spp., rom Vitex doniania, Bombax costatum and non-Pterocarpus erinaceus.*

The shrub savannah occurs extensively in rough terrain close to hills and ridges in all parts of the territory, and cover about 12.9% of the total area. Specie composition varies extensively.

#### RESULTS AND DISCUSSIONS

Most of the vegetation of the proposed project area of study at Aviation Village, Abuja Municipal Area Council (AMAC), Abuja FCT, and adjoining community, which used to be dominated by the savanna vegetation species, has now been seriously wiped out; with present vegetation cover being majorly of secondary or even later growth.

The dominant plant species found at the proposed project area include the following:

- Neem Plant (*Azadirachta indica*)
- Cashew Plant- Christmas Berry (*schinuster ebinthfolius*)
- Twin Berry Honey Suckle Plant (*Lonicera involucrate*)
- Kidney Beans Plant (*Fragula Californica*)
- Golden rain tree (*cassia fistula*)
- Maize: -*Zea mays* L. *Poaceae*
- White mustard: - *Sinapis alba* L. *Brassicaceae*

Twin berry honey suckle plant (*Lonicera involucrate*) had the highest relative abundance followed by Golden rain tree (*cassia fistula*) while Neem plant (*Azadirachta indica*) has the lowest relative abundance



**Plate 4.9: Photo of Vegetation at the Proposed ATK Depot Site, Abuja**



**Plate 4.10: Photo of Vegetation at the Proposed ATK Depot Site Abuja**



**Plate 4.11: Photo of Vegetation at the Proposed ATK Depot Site, Abuja**



**Plate 4.12: Photo of Vegetation at the Proposed ATK Depot Site Abuja**



**Plate 4.13: Photo of Vegetation at the Proposed ATK Depot Site, Abuja**



**Plate 4.14: Photo of Vegetation at the Proposed ATK Depot Site Abuja**

### 4.2.7 AESTHETIC QUALITY

4.2.7-1 Based on the state of the environment around the site as it appeals to the senses (sight, taste, smell, hearing, and touch) prior to the planned project, it is unkempt.

4.2.7-2 The site plus surrounding areas, if abandoned could serve as hideout to environmental refugees and could pose as threat to human health and the overall aesthetic of the area.

4.2.7-3 Hence, an alternative application of the site for other purposes with potential for upgrading the aesthetic of the environment should be most welcomed.

### 4.3 SOCIO-ECONOMIC CHARACTERISTICS

4.3.1 "Socioeconomic" is here defined as: "of relating to, or involving a combination of social and economic factors"

4.3.2 In general, socioeconomic factors that can be considered in the assessment of environmental impact range from social impact (population growth, density, aesthetics, standards of living, congestion, incompatibility with surrounding community, increase in recreational requirement, and conflict in lifestyles) to additional requirements, for public services (water, sanitation, telephone, natural gas, electric facilities, police and fire protection, solid wastes disposal, and over-loading of schools). Studies carried out in the U.S.A show that every 1,000 new people in a community will require:

1. An additional supply of 375,000 to 750,000 litres of water daily, or 300 individual water well systems, many equipped with water conditioners;
2. The collection and disposal of 1,800 to 2,7000 kg of solid waste daily;
3. Recreational facilities to serve more people with more leisure time;
4. Sewage treatment facilities to handle 375,000 to 562, 500 litres of sewage per day containing 76.5kg of Organic Matter (Biochemical Oxygen Demand) per day, and 90 kg of dry sewage solids per day, or 300 additional septic tanks and appurtenant subsurface disposal facilities;
5. A minimum of 4.8 new elementary schoolrooms, 3.6 new secondary school rooms, and additional teachers;
6. At least 10.0 acres of lands for schools, parks, and play areas;
7. Approximately 1.8 policemen and 1.5 firemen; also new public service employees in public works, social services, recreation, health, and administration;
8. More than a mile of new streets;
9. More streets to cleans and drain;
10. Two to four additional hospital beds, three nursing home beds and appurtenant facilities;
11. At least 1,000 new library books;

12. More automobiles, retail stores, services, commercial and industrial areas, community and states parks, and other private enterprises.

4.3.3 Though economic conditions are generally not directly part of an Environmental Impact Assessment, economic structure (employment by industry; public versus private sector income; economic base; income/wealth distribution) and environmental consequences of changes in these conditions are part of an environmental impact assessment.

4.3.4 Economic conditions however, are the factors that should be balanced against environmental gains and losses; for, changes in economic conditions (that is, income, employment, production, or output) lead to effects on the environment.

4.3.5 The socio-economic characteristics of the study area will therefore be looked at from the following:

#### **4.3.6 Historical Background**

The land called Abuja was originally the south-western part of the ancient Habe (Hausa) kingdom of Zazzau (Zaria). It was populated for centuries by several semi-independent tribes. The largest of the tribes was Gbagyi (Gwari), followed by the Koro and a few other smaller tribes.

The history of present-day Abuja, however, began in 1975, in an attempt to solve the various problems (population pressures, political and ethnic divisions, etc.) of Lagos as the capital of Nigeria, wherein the present site was selected out of thirty-three (33) contending ones, then. The criteria used for selection included: centrality, healthy climate, land availability and use, water supply, multi-access possibilities, security, existence of resources, drainage, good soil, physical planning convenience and ethnic accord.

The Emir of Abuja at the time, Altai Suleiman Barau, was asked to meet with his Emirate Council to approve contributing four of the five districts to Abuja to become the new capital. The council was divided as some districts considered it too much of a sacrifice; but at the end, they approved the request from the Federal Government. Thus, the Abuja in Niger State contributed 80% of the land of the territory, Plateau State (Now Nassarawa State) contributed 16 percent of the South east territory and Kwara State (now Kogi State) contributed about four percent of the south-west territory.

The Emirate was thereafter asked to give up the Abuja for the Federal Capital Territory. Again, the council was divided. In the end, they agreed. believing that the name of the emirate would become famous throughout the world. The previous town of Abuja was

renamed: "Suleja" after the first two syllables ("Sule") of then then Emir, Suleiman Barau's first name and "Ja" the last syllable of the first emir's last name (Ishaku Jatau). Another interesting historical fact is that in the Gbagyi (or Gwan) language, the word "Aso means "success" or "victory". According to tradition, the original inhabitants of the region lived at the base of the rock for centuries without being conquered. The rock was a refuge as well as mystical source of strength. Asoro "(Aso Koro)", the name of the one of the local areas, therefore, means "people of victory." In addition, the term "Aso Rock" is increasingly being used to refer not only to the physical structure of the most imposing rock in the area, but also as a symbol of government power and the nation.

On February 4, 1976, a decree was signed, establishing the Federal Capital Territory of Abuja and setting up the Federal Capital Development Authority (FCDA), the organisation charged with the task of developing the new capital.

The 1979 master plan called for Abuja to be developed in four phases. However, the FCT Abuja officialy became the capital of Nigeria on 12 December 1991.

There are six Area Councils (Abaji, AMAC, Bwari, Gwagwalada, Kuje and Kwali) in the Federal Capital Territory, each subdivided into wards headed by local councils. The Minister of the Federal Capital Territory is the overall leader and is appointed by the President of Nigeria.

The location of the proposed project is Aviation Village, within the Abuja Municipal Area Council of the Federal Capital Territory (FCT) of Abuja, wirh Garki as headquarter. The main communities bordering the proposed project location are: Zamani Village and Wulmo Village.

Besides the above stated communities, there are other settlements nearby, which include: Goodluck Ebele Jonathan Golf Club, Nigeria Airforce Base, Nigeria Airforce Officers Mess, Nigeria Prison Service National Headquarter, Wukara Village, Bassa Village, Bassanjiwa Village, Iddo and NITEL / P&T Settlement.

#### **4.3.7 Social Conditions**

Though the proposed project site is located within the vicinity of Nnamdi Azikiwe International Airport, a number of the villages neighbouring the site lack the basic social amenities such as hospitals / healthcare facilities, electricity, good road network, public water supply, schools, etc

Abuja Municipal Area Council (AMAC), where the site of the proposed ATK depot project is being located, had no recorded population as per 1991 census figure, but according to 2006



census result, it had a population of about 776,298 persons, thereby making it the most populous local government area in the FCT, accounting for 55.2% of total. With a total land mass of about 1,476 square kilometres (km<sup>2</sup>) it is the second (2<sup>nd</sup>) largest local government area of the six (6) local government areas of the Federal Capital Territory. However, despite being second on land mass, it has the highest population densities of the local government areas in the FCT, having a population density of 526.0 people per square kilometre (km<sup>2</sup>) according to 2006 census (see Table 4.20). And based on 2016 estimates, the population of AMAC increased to 1,967,500 people with a population density of 1,333 people per square kilometre (km<sup>2</sup>), still maintaining its lead in both population and population density.

The epileptic management of social facilities in recent times has led to the collapse of some of the available social infrastructures.

Table 4.20: Demography of Federal Capital Territory (Abuja) Area Councils Highlighting Abuja Municipal Area Council

PLACE	STATUS	1991 CENSUS RESULTS			LAND SIZE		2006 CENSUS RESULTS			2016 PROJECTION			
		Population	DENSITY		in Km <sup>2</sup>	in Mile <sup>2</sup>	Population	DENSITY		Population	DENSITY		
			Population per Km <sup>2</sup>	Population per Mile <sup>2</sup>				Population per Km <sup>2</sup>	Population per Mile <sup>2</sup>		Population per Km <sup>2</sup>	Population per Mile <sup>2</sup>	
<b>Federal Capital Territory (Abuja)</b>	<b>Territory</b>	<b>371,674</b>	<b>48.8</b>	<b>125.1</b>	<b>7,620</b>	<b>2,942.1</b>	<b>1,406,239</b>	<b>184.6</b>	<b>473.2</b>	<b>3,564,100</b>	<b>467.7</b>	<b>1,199.2</b>	
1.	Abaji	Local Government Area	21,081	22.2	57.0	948	366.0	58,642	61.9	158.6	148,600	156.7	401.8
2.	<b>Abuja Municipal Area Council</b>	<b>Local Government Area</b>	<b>---</b>	<b>---</b>	<b>---</b>	<b>1,476</b>	<b>569.9</b>	<b>776,298</b>	<b>526.0</b>	<b>1,348.6</b>	<b>1,967,500</b>	<b>1,333</b>	<b>3,417.9</b>
3.	Bwari	Local Government Area	---	---	---	1,031	398.1	229,274	222.4	570.2	581,100	563.7	1,445.4
4.	Gwagwalada	Local Government Area	---	---	---	1,036	400.0	158,618	153.1	392.6	402,000	387.9	994.6
5.	Kuje	Local Government Area	44,338	23.5	60.2	1,888	729.0	97,233	51.5	132.1	246,400	130.5	334.6
6.	Kwali	Local Government Area	---	---	---	1,241	479.2	86,174	69.4	178.1	218,400	176.0	451.3
	<b>Nigeria</b>	<b>Country / Federal Republic</b>	<b>88,992,220</b>	<b>96.3</b>	<b>247.0</b>	<b>923,768</b>	<b>356,668.82</b>	<b>140,431,790</b>	<b>152.0</b>	<b>389.8</b>	<b>193,392,500</b>	<b>209.4</b>	<b>536.8</b>

Source: National Population Commission of Nigeria (web); National Bureau of Statistics (Web)

Unlike what obtains in the communities in modern urban settlements, the literacy rate of the people directly bordering the site of the proposed ATK depot project is low; this can be attributed to the absence of educational institutions - both primary and secondary schools – within the immediate environment, with the closest being between two and half, and four and half kilometres away. The inadequate intervention of governments (federal, territorial and local) to education has adversely affected the provision of good educational facilities for the communities.

Based on records obtained from Federal Capital Territory Universal Basic Education Board (fctubeb) and FCT Education Management Information System (FCT EMIS), Abuja Municipal Area Council (AMAC), has 238 public and 1251 schools. Table 4.21 below shows the Schools population Abuja Municipal Area Council. Both public and private schools offer services, however, the private ones are the most vibrant as they, besides the normal education services, also offer such other services as pre-school education, not usually offered by public schools.

**TABLE 4.21: Public and Private Schools in Abuja Municipal Area Council of Federal Capital Territory (Abuja)**

<i>Local Government</i>	<i>No. of Schools</i>	
Abuja Municipal Area Council	1489	
	<b>Public Schools</b>	<b>Private Schools</b>
	238	1251

Source: Federal Capital Territory Universal Basic Education Board and FCT Education Management Information System

#### 4.3.8 Economic Base and Activities

The Federal Capital Territory (Abuja) is both the political and administrative capital of Nigeria – the location of the Three Arm – The Executive Headquarters (Aso Rock Villa), the National Assembly Complex and the Supreme Court. So, it plays host to several embassies, high commissions, international / multilateral bodies, including Economic Community of West African States (ECOWAS) among others. Hence, Abuja is a multi-ethnic cosmopolitan city serviced by good transportation network, hotels and other facilities to support its flourishing administrative, business, commercial and light industrial activities.

Despite the above, the indigenes of the neighbouring communities can be said to live in the neglected rural slums within the bubbling urban territory, with they being mainly artisanal farmers / farmland workers, artisans, transporters (motor bikes and tricycles) and petty traders.

4.3.9 There are several open markets located within the Federal Capital Territory (Abuja), and Abuja Municipal Area Council (AMAC) in particular, which also serve members of the communities.

Some of the markets within Abuja Municipal Area Council (AMAC) are:

Wuse Market;	New Kurudu Modern Market;
Utako Ultra Modern Market;	Dei Dei Building Material Market;
Wuye Ultra Modern Market;	New Dei-Dei Regional Market;
Garki Ultra Modern Market;	Gwagwa Market;
Garki International Market;	Idu Market
Mabushi Ultra Modern Market;	Karmo Open Market;
Dubai Abuja International Market, Kaura;	Kabusa Market;
Durumi I, Market;	Kugbo Timbre Market;
Kado Fish Market;	GSM Village Wuse Zone 1;
Gwarimpa Market;	Dei-Dei Ultra Modern Market;
AMAC Market Lugbe;	Tipper Garage Market;
Apo Resettlement Market;	NAFOWA Mini Market, Aviation Village;
Karu Ultra Modern Market;	

#### 4.4 Health Care

The objective of Health Impact Assessment Study carried out is to produce a baseline health status of the community around the proposed project area. This brief report is a presentation of the collected and analyzed baseline data, which could be used for more detailed Health Impact Assessment and the development of a Health Management Plan for the proposed Aviation Turbine Kerosene (ATK) depot Facility, at Aviation Village, within the Abuja Municipal Area Council of the Federal Capital Territory (FCT) of Abuja.

##### 4.4.1 Health Services within Proposed Project Area

There are no public health facilities available within the immediate vicinity of the proposed project, the closest being between two-and-half and four-and-half from the communities.

Some of the corporate establishments around have in-house clinics where initial medical attention is usually first rendered to staff members and then the hospitals with which the Companies have retainership arrangements; but in the case of the community members, initial medical attention is usually sought through the herbalists / native doctors and then possibly, the primary health care centres.

#### 4.4.2 Common Ailments/Diseases

Actual figures could not be ascertained, but from random sampling exercise conducted, interviews of residents and workers around the area, the most prevalent health problems are fever and stress related conditions.

Other health complains are diarrhoea, catarrh and cough and body pains.

#### 4.4.3 Basic Amenities

The Federal Capital Territory Water Board (FCTWB), was established through an Act and saddled with the responsibility for water supply / distribution around the FCT.

Though the FCTWB boasts of modern infrastructure, as earlier stated, water supply to all parts of the territory, including the immediate neighbours of the proposed project site, is still unreliable and often, potable water is not easily accessible to the residents.

There is a shallow stream that flows through to the communities that sometime serve as source of domestic water uses.

There is a big shortage of affordable housing and appropriate shelter in the FCT. The stated situation has resulted in the sprawling of slums around FCT. Though there are some efforts by Government in collaboration with private developers, they are not likely to solve the problem in the very near future as they are not affordable to the generality of paid workforce, as they are priced beyond realizable incomes of those they are meant for.

## 4.5.0 CONSULTATION

### 4.5.1 INTRODUCTION

The EIA process establishes the past and current environmental conditions in an area (physical, biological, chemical, and socio-economics) and determines the probable impacts of a project on the environment. It involves a wide spectrum of concerned sectors including the adjacent communities, which will be affected by the proposed project / development. Exchange of views, information and concerns must be taken into consideration in order to bring into effect, projects, which are not only beneficial to the majority, but also acceptable to the concerned communities. Peoples' participation / active involvement of the community in the decision-making process, increases public confidence in the decision-making process, informs programme development, generates information for designing mitigation programmes and monitoring activities during the construction and subsequent operations. It, in addition to the above, serves for impact evaluation.

From the foregoing, it is explicit that public consultations and discussions with stakeholders are compulsory.

### 4.5.2 Objectives of Consultation

The overall objectives of the Consultation programme for the Tankfarm Project are to:

1. Identify key stakeholders, provide information for them and obtain information on their interests and concerns.
2. Understand the values about the environment held by individuals and groups within the proposed project's area of influence;
3. Ensure that fears or apprehensions about the nature, scale and impact of the project have been fully addressed.
4. Avoid conflicts by addressing issues promptly.
5. Learn about the project environment through local sources of knowledge to help in environmental planning for the project and provide solutions to identified concerns.

### 4.5.3 Methodology

A standard method for determining sample size was used for the type of data that was required; and taking into account the need for more information on the population, the statistical calculation, on which the sample size was used, was determined. The analysis upon which the sample frame was chosen is based on Federal Capital Territory (Abuja) data, which refers to similar data from rural areas with similar socio-economic characteristics.

### 4.5.4 Limitations of the Study

The baseline surveys which were designed to collect data relating to settlements within the immediate area of influence of the proposed project site and also members of the Communities were restricted to the establishment of a baseline to aid formulation of impact mitigation plans and for later evaluation of the impacts of project.

The information as relate to the stakeholders, relies heavily on the survey conducted during the field works for the preparation of the EIA for the proposed ATK depot project.

#### 4.5.5 Survey Outcomes

The outcomes of the survey conducted in the proposed project's area of influence to determine stakeholders' interests and concerns are as shown below. These results represent the baseline socioeconomic data based on information generated from sampled groups in the studied communities.

**TABLE 4.22: DISTRIBUTION OF INTERVIEWS AND FOCUS GROUP DISCUSSIONS WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Community	No. of Households	No. of Interviewees per Household	Focus Groups
Zamani	17	1	1
Wulmo	12	1	1
Ido	2	1	1
<b>Total</b>	<b>31</b>		<b>3</b>

Sources: Field Survey, 2020

As shown in Table 4.22, a total of thirty-one (31) households were interviewed within three (3) communities around the proposed project area; three (3) focused groups were formed and thirty-one (31) key persons represented others.

However, the results of the analyzed questionnaires are shown in Tables 4.22 to 4.27, below.

**TABLE 4.23: SEX AND MARITAL STATUS OF INTERVIEWEES WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Communities	Male (M)	Female (F)	Total	%		
				Male	Female	Total
Single	6	1	7	19.4	3.2	22.6
Married	19	3	22	61.4	9.6	71.0
Divorced/Widowed	2	-	2	6.4	-	6.4
<b>Total</b>	<b>27</b>	<b>4</b>	<b>31</b>	<b>87.2</b>	<b>12.8</b>	<b>100</b>

Sources: Field Survey, 2020

**TABLE 4.24: AGE DISTRIBUTION OF INTERVIEWEES WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Age Range of Household Members	Male (M)	Female (F)	Total	%		%
				Male	Female	
Less than or equal 30	7	2	9	22.6	6.4	29.0
31 – 40	8	2	10	25.8	6.4	32.3
41 – 50	6	-	6	19.4	-	19.4
51 – 60	4	-	4	12.8	-	12.9
Greater than 60	2	-	2	6.4	-	6.4
<b>Total</b>	<b>27</b>	<b>4</b>	<b>31</b>	<b>87.2</b>	<b>12.8</b>	<b>100</b>

Sources: Field Survey, 2020

**TABLE 4.25: EDUCATIONAL STATUS OF INTERVIEWEES WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Educational Level	Male (M)	Female (F)	Total	%		%
				Male	Female	
None	10	1	11	32.3	3.2	35.5
Primary	7	-	7	22.6	-	22.6
Secondary	7	2	9	22.6	6.4	29.0
Tertiary	3	1	4	9.6	3.2	12.8
<b>Total</b>	<b>27</b>	<b>4</b>	<b>31</b>	<b>87.2</b>	<b>12.8</b>	<b>100</b>

Sources: Field Survey, 2020

**TABLE 4.26: OCCUPATION OF INTERVIEWEES WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Occupation	Male (M)	Female (F)	Total	%		%
				Male	Female	
Government	2	-	2	6.4	-	6.4
Privates companies	7	1	8	22.6	3.2	25.8
Self employed	6	1	7	19.4	3.2	22.6
Unemployed	12	2	14	38.8	6.4	45.2
<b>Total</b>	<b>27</b>	<b>4</b>	<b>31</b>	<b>87.2</b>	<b>12.8</b>	<b>100</b>

Sources: Field Survey, 2020

**TABLE 4.27: HOUSEHOLD SIZE DISTRIBUTION OF INTERVIEWEES WITHIN AREA OF INFLUENCE OF THE PROPOSED TANK FARM PROJECT**

Household Size	Male (M)	Female (F)	Total	%		%
				Male	Female	
2 – 5	6	1	7	19.4	3.2	22.6
6 – 9	14	2	16	45.2	6.4	51.6
10 – 13	7	1	8	22.6	3.2	25.8
Greater than 14	-	-	-	-	-	-
<b>Total</b>	<b>27</b>	<b>4</b>	<b>31</b>	<b>87.2</b>	<b>12.8</b>	<b>100</b>

Sources: Field Survey, 2020



The study revealed that most members of the communities captured during the interviews / circulation of questionnaires, were between the ages of from less than 30 years to 50 years. As par the respondents, 87.2% are male, while 12.8% were female.

As concerns type of occupation, 6.4% work with government, 25.8% with private companies, 22.6% were self employed, while 45.2% were unemployed.

With respect to the literacy status of the respondents, 45% have passed through tertiary institutions, 26% are of JSC/SSC level, 11% are of primary school level, while 18% were literates without formal education.

With respect to the household size, 22.6 % belong to households of 2-5 persons, 51.6% to those of 6-9 persons, while 25.8% belong to those of 10-13 persons per household.

#### 4.5.6 Stakeholders

The stakeholders in this context are those who will be affected to varying degrees by the impact of the proposed project. Thus, there are two classes of stakeholders - Primary and Secondary.

The Primary Stakeholders are the host communities, that is, those who live near the proposed project site.

The Secondary Stakeholders include:

1. The Territorial and Local Governments;
2. The Regulatory Agencies relevant to the proposed project implementation;
3. Non-Governmental Organisations;
4. The media;
5. Those with specialist technical or scientific knowledge relevant to the proposed tank farm project;
6. Members of the public who may feel that the proposed project may in one way or the other affect their work or life.

#### 4.5.7 The Communities

The identified communities of the proposed ATK depot Project include:

1. The Companies and organisations existing within the neighborhood;
2. Individuals leaving/working within the proposed project area, etc.

A number of these were consulted. Meetings were held with the different groups within the community (see Plates 4.15 and 4.24 for some pictures taken at such occasions and Table 4.28, below for the Stakeholder Consultation Mechanism used).

**TABLE 4.28: STAKEHOLDERS CONSULTATION MECHANISM AND STATUS OF THE CONSULTATION FOR THE PROPOSED ATK DEPOT PROJECT AT AVIATION VILLAGE, ABUJA MUNICIPAL AREA COUNCIL (AMAC), FEDERAL CAPITAL TERRITORY (FCT), ABUJA**

STAKEHOLDER	CONSULTATION MECHANISM	STATUS OF CONSULTATION
Affected People	Interviews and meetings with Leaders of Affected People	Interviews and meetings have been conducted as part of EIA study in the communities where the proposed Tank Farm facilities will be located
Community	Meetings with Community Representatives concerning the proposed project.	Meetings have been held with the representatives of the community in respect of the proposed Tank Farm Project

#### 4.5.8 The Stakeholder Concerns

During the several interactions (both formal and informal) with stakeholders with respect to the proposed Tank Farm project, the following concerns were expressed:

1. The possibility of the neighbouring communities receiving support in the form of establishment / provision of the following amenities:
  - Medium Tension Electrical Transformers;
  - Primary and Secondary Schools;
  - Healthcare Centre;
  - Potable water supply source;
  - Grading of the access roads to the communities;
2. Possibility of employment opportunity;

The above stated concerns were however addressed during the consultations:

1. They were guaranteed that the best industry practice will be employed during the construction and operation of the facility, to ensure that damage to the environment and people will be totally avoided.
2. With respect to the possibility of the neighbouring communities receiving support in the form of establishment / provision of some social amenities lacking in the communities, they were assured that the company shall work with their representatives to envision and sponsor projects that will carry the highest interest of the majority of community members at any given time. Such sponsored projects shall be developed to be self sustaining and shall be completely owned by the communities upon being delivered / commissioned.
3. As regards the issue of employment, it will be part of the proponent's employment policy to allocate a specific percentage of its intended manpower to the indigenes of the community, provided they fulfill the requirements.



**Plate 4.15:Photo of Stakeholders while being shown the site of the Proposed ATK Depot Site, Abuja**



**Plate 4.16:Photo of Stakeholders after a Meeting held in respect of the Proposed ATK Depot Site Abuja**



**Plate 4.17:Photo of Wulmo Village near Proposed ATK Depot Site, Abuja**



**Plate 4.18:Photo of a street in Wulmo Village Near Proposed ATK Depot Site Abuja**



**Plate 4.19:Photo taken during a Focus Group Discussion with Wulmo Community**



**Plate 4.20:Photo taken during a Focus Group Discussion with Wulmo Community**



**Plate 4.21: Photo taken during a Focus Group Discussion with Wulmo Community**



**Plate 4.22: Photo taken during a Focus Group Meeting with Zamani Community Representatives**



**Plate 4.23: Photo taken during a Focus Group Meeting with Zamani Community Representatives**



**Plate 4.24: Photo taken during a Focus Group Meeting with Zamani Community Representatives**

## CHAPTER FIVE

### 5.0 ASSOCIATED AND POTENTIAL IMPACT ASSESSMENT

#### 5.1 General

This chapter highlights the associated and potential impacts of the proposed A. A. Rano Nigeria Limited's ATK Depot project on the following Environmental Components of the proposed project location area:

1. Climate;
2. Air Quality;
3. Water Resources;
4. Geology, Topography and Soil;
5. Ecology;
6. Socio-Economic (Human and Community Health).

The impacts analysis covers the following aspects of the proposed tank farm project activities:

1. Site Preparation Phase:
  - Sand Filling the site;
  - Soil Conditioning and Stabilization;
  - Geotechnical Surveys for Tank Farm Installation Suitability;
  - Internal Route Preparation, Excavation, Debris Disposal, etc.
2. Construction Phase:
  - Mobilization of men and equipment to site;
  - Foundations (Tanks, Buildings, Pump Sheds, Bund walls, Separators, Loading Bay, etc.);
  - Erection of Office Building, MMC & Control Room;
  - Fabrication & Erection of Loading Bay Structures;
  - Construction of Internal Route and Tank Trucks and Refuellers Park;
  - Fabrication of Product Tanks, Firewater Tank, Slop Tanks, Foam Tanks & other Fire Fighting Systems;
  - Construction of Oil/Water Separator and Drains;
  - Sinking Monitoring Wells;
  - Construction of Water and Wastewater Treatment Plants;
  - Procurement & installation of the various Pumps;
  - Piping Fabrication as per MFD's and line list;
  - Procurement and Installation of Cablings, switches and controls to all electrical drives and lights;
  - Procurement & Installation of all Instrumentation Equipment;

- Procurement & Installation of SCADA System;
3. Operation Phase:
    - Receiving Aviation Turbine Kerosene (ATK) from refineries (both locally and through imports);
    - Storing the received Aviation Turbine Kerosene (ATK);
    - Loading and delivering the above stated product to Refuellers and Aircrafts;
  4. Decommissioning and Abandonment Phase:
    - Staffs Disengagement;
    - Controlled Demolition of Existing Structures;
    - Clearing, Sorting/Separation of removed Materials;

The chapter also presents the methodology adopted for (and the results of) the assessment of the potential (those that could occur) and associated (those that will occur) environmental impacts of the proposed A. A. Rano Nigeria Limited's ATK Depot Facility Project.

Impacts (as against "effects", which are any changes in the environment) are significant alterations in environmental variables or attributes over a specific period of time and within a defined area resulting from particular activities compared with the situation, which would have occurred had the activities not been considered. Environmental systems are not usually static but change over the course of time even without the influence of man; that is, some are dynamic while others change imperceptibly. To make predictions about impacts therefore, assumptions need be made about natural changes. The distinction between environmental impacts and changes in environmental variables or attributes is that changes in the attributes provide an indication of changes in the environment. Consequently, the set of attributes must provide a model for the prediction of all impacts. The evaluation of impact is based on impact's overall significance, magnitude, cumulative effects, direct effects, long-term effects, short-term effects and reversibility.

The steps involved in evaluating environmental impacts are:

- i. Identification of impacts on attributes;
- ii. Measurement of impacts on attributes;
- iii. Aggregation of impacts on attributes to reflect impact on environment.

The approach generally involves matching the various activities of the proposed project as described in chapter three of this report with the various components of the project environment, which have also been presented in chapter four (4) of this report. Their interactions may lead to changes in or impacts on the environment (main focus of this chapter of the EIA report), hence mitigation measures are proffered in order to reduce, offset or ameliorate such impacts (this is presented in chapter six (6) of this EIA report). However, for effective functioning of such measures, an Environmental Management Plan (EMP) has been developed (this is presented in chapter Seven (7) of this EIA report) to cover the entire phases and activities of the proposed project.

## 5.2 Assessment Methodology

The EIA analysis was conducted in three (3) main sequential phases:

1. Impacts Identification/Categorization;
2. Impact Significance Evaluation; and
3. Defining Control for Significant Impacts; as presented below.

### 5.2.1 Impact Identification and Characterization

To effectively carry out this requires a thorough understanding of the project activities (Project Description as contained in chapter 3 of this report), the Project Setting (the Existing Environment Description as contained in chapter 4 of this report), and the interactions between these components.

A matrix (based on Leopold et al, 1971) was used for the impacts identification/categorization. The matrix matches project activities against environmental (climate and Air Quality, Water Resources, Geology and Soil, Ecology, and Socio-economic) components, and supports a methodical, comprehensive, and objective identification of the impacts each project activity may have on each of these environmental components.

In developing the matrix for the identification/categorization of impacts, specific environmental impact indicators were also developed for each of the environmental interaction categories. Impact indicators are the observable or measurable parameters of each environmental component that can be directly or indirectly linked to changes in environmental conditions.

Table 5-1 shows, below, the Environmental Components, the Specific Environmental Impact Indicators, and briefs on identifying impacts.

**Table 5.1: Environmental Components and Specific Environmental Impact Indicators**

<b>ENVIRONMENTAL COMPONENTS</b>	<b>SPECIFIC ENVIRONMENTAL IMPACT INDICATORS</b>
<b>Socio-economic and Community Health)</b>	Population Characteristics: – changes in population, gender ratio and age distribution
	Cultural/Institutional Resources: – effects on cultural, historical and archaeological resources
	Transportation: – changes in efficiency moving from place to place
	Education: – changes in school enrolment and attendance
	Economic Stability: – effects on economic diversity of the area
	Political and Social Resources: – changes in local authority and governance, and social behaviours
	Community Resources: – changes in housing, water supply, sewage disposal and utilities
	Pollution Related Health Effects: – increase in concentration of air pollutants, water quality and noise and vibration levels above acceptable limits
	Accidents/Explosions/Fire: – changes in rate of occurrence and severity
<b>Ecology</b>	Large Animals: – changes in population, health, diversity and species abundance
	Predatory Birds: – changes in population, health, diversity and species abundance
	Small Games: – changes in population, health, diversity and species abundance
	Fish, Shell Fish, Water Fowls: – changes in population, health, diversity and species abundance
	Field Crops: – changes in population, health, diversity and species abundance
	Endangered Species: – changes in population, health, diversity and species abundance
	Natural Land Vegetation: – changes in population, health, diversity and species abundance
	Aquatic Life: – changes in population, health, diversity and species abundance
	Plankton: – changes in population, health, diversity and species abundance
<b>Geology and Soil</b>	Land Use: – conflicts in land use
	Soil Fertility: – changes in soil nutrients and ability to support vegetation
	Erosion: – changes in soil texture and land gradient
	Drainage: – changes in pattern
	Aesthetic Quality: - changes in quality or distinguishable characteristics of the environment
<b>Water Resources</b>	Flow Pattern: – changes in velocity of flow
	Turbidity: – changes in suspended materials concentration
	Total Suspended Solids (TSS): – changes in concentration
	Biochemical Oxygen Demand (BOD): – changes in concentration
	Dissolved Oxygen (DO): – changes in concentration
	Hazardous Substances: – changes in concentration
	Acid and Alkali: – changes in concentration
	Nutrients: – changes in concentration
	Odour: – effects on
	Oil and Grease: – changes in concentration
	Feacal Coliforms: – changes in coliform density
	Aquifer Safe Yield: – changes in groundwater system availability
	pH: – changes in concentration
	Hydrocarbon Content: – changes in concentration
<b>Climate and Air Quality</b>	Diffusion Factor: – effects on weather
	Particulates: – changes in concentration
	Sulphur Dioxide: – changes in concentration
	Hydrocarbons: – changes in concentration
	Carbon Monoxide: – changes in concentration
	Nitrogen Oxides: – changes in concentration
	Photochemical Oxidants: – changes in concentration
	Hazardous Toxicants: – changes in concentration
	Odour: – effects on
Noise/Vibration: – changes in noise and vibration levels at receptor points	



### Screening Matrix for Potential Impacts (based on Leopold et al, 1971)

Table 5.3 shows the Potential Impacts Screening/Categorization Matrix (based on Leopold et al, 1971) used in this report. It consists of vertical list of Specific Environmental Impact Indicators that could be affected by proposed project activities and horizontal list of Project Activities, which are potential sources of impact, that is, Environmental Aspects (elements of an activity that can or will interact with the Climate and Air Quality, Water Resources, Geology and Soil, Ecology, and Socio-economic conditions within the area of influence). In addition to the matrix, expert opinion was used in the proposed project impacts screening, as there is no universal methodology, which can be applied to all project types in all environmental settings (Canter, 1991).

Entries in the cells of the matrix are based on the character (that is, either positive or negative) and represent preliminary ranking of the severity of the impacts. The matrix table contains allotted ranks and are as given below; and the scores allocated per Attribute are based on the Analysis/Assessment Results of samples taken/facilities studied:

#### Impact Scores Schedule

High/Major Impact:	3
Medium/Moderate/Average Impact:	2
Low/Minor Impact:	1
Negligible/No Impact:	0 or -

These impact assessment rankings are defined as follows:

1. A Major or High Impact - is one that would affect a large (higher than 40%) segment of a resource and/or have a relatively large spread/coverage (beyond the project boundary) and persists for a long time or recovery would not occur within five (5) years or is irreversible.
2. Moderate or Medium Impact – is one that will affect an averagely large (between 10% and 39%) segment of a resource and/or a moderate spread (within the project boundary) and/or recovery of initial conditions requires some time; Simple mitigating practices are needed.
3. A Minor or Low Impact is one that could affect a small (between 1% and 9%) segment of a resource; or a moderate segment of a resource but with a mid to short term effect and is most likely reversible.
4. A Negligible Impact is one that may occur but based on experience, available scientific information and expert knowledge will have no measurable effect on the receptor.

Both likely and unlikely potential impacts are considered at this stage; however, the likelihood of occurrence of an impact is further assessed in the details in later sections of this chapter.

In addition to the aforementioned, the Scores allotted per Attribute are based on the:

1. Available knowledge of the proposed project activities;
2. Analysis/Assessment Results of samples taken/facilities studied in the proposed project coverage area;
3. Consultation with experts and professional judgement;
4. Assessment results of similar projects in similar environments;

The impacts were further classified as adverse or beneficial, direct or indirect, cumulative and / or residual, long term or short term, and normal or abnormal and defined in table 5.2, as follows:

**Table 5.2: Impact Categories and Their Definitions**

S/N	IMPACT CATEGORY	DEFINITION
1.	<b>Direct Impacts</b>	Impacts resulting directly from a project activity (direct cause - effect consequence)
2.	<b>Indirect Impacts</b>	Impacts that are at least one step removed from a project activity. They do not follow directly from a project activity
3.	<b>Adverse (Detrimental) Impacts</b>	Impacts that would produce negative effective on the biophysical, chemical or socio - economic environment
4.	<b>Beneficial (Positive) Impacts</b>	Impacts that would produce positive effects on the biophysical, chemical or socio - economic environment
5.	<b>Cumulative Impacts</b>	These are impacts arising from the interaction of project components or activities with other activities of the past or those occurring simultaneously, or sequentially. In other words, these are impacts which are already in existence but become progressively greater in size, extent, quantity or intensity due to the addition of an activity or activities
6.	<b>Residual Impacts</b>	Impacts that would remain after mitigation/enhancement measures have been applied
7.	<b>Long-Term Impacts</b>	Impacts which remain beyond two (2) months after mitigation/enhancement measures have been applied
8.	<b>Short-Term Impacts</b>	Impacts with life span less then two (2) months after mitigation / enhancement measures have been applied
9.	<b>Normal Impacts</b>	Impacts associated with routine activities and operations
10.	<b>Abnormal Impacts</b>	Impacts associated with irregular / upset conditions and / or non-routine / accidental events.

Only potential impacts that could be caused by the proposed project are considered in details in the next stage of the assessment process.



## 5.2.2 Impacts Severity and Significance Evaluation

In reviewing the already identified potential impacts (that were not screened out at the previous stage) in details and also determining the significance of those impacts on the following Environmental Components:

1. Climate and Air Quality;
2. Water Resources;
3. Geology, Topography and Soil;
4. Ecology; and
5. Socio-economy (Human Economic and Community Health),

these five (5) criteria:

1. Duration;
2. Frequency;
3. Magnitude;
4. Areal Extent; and
5. Importance (Sensitivity of the Receptor),

were used.

The above stated criteria were applied to all identified potential impacts to determine their Character (Positive or Negative), Severity (High or Medium or Low or Negligible) and also Significance.

### 5.2.2.1 Impacts Severity Evaluation Criteria

Impacts, having both temporal and spatial components (according to Wathern, 1984), the five (5) impact evaluation criteria (Duration; Frequency; Magnitude; Areal Extent and Importance (Sensitivity of the Receptor)) in combinations express this basic characteristic of impacts.

Duration in combination with Frequency give the overall Temporal Impact rating and Magnitude in combination with Areal Extent give the overall Spatial scope of the impact. Both the Temporal and Spatial components of the impacts (as determined above) in combination with Importance then give the overall severity rating of the impacts.

The five (5) impact evaluation criteria stated above are herein defined below:

**Duration** - is defined as the time that is estimated for a population or resource to return to baseline conditions (pre-impact conditions). The duration is calculated from the time the impact begins, which may coincide with the start of the activity that causes the impact. The duration of an impact is characterized as given below:

1. High - long-term impact (throughout the project, or is irreversible);
2. Average - moderate-term impact (during the project operation, or is reversible)

- only with human assistance);
3. Low - short-term impact (during the project construction stage, or is reversible without the need for human assistance);
  4. Negligible - impact or recovery time is very short or immediate

**Frequency** - is defined as the number of times an impact is expected to occur over the life of the project. The frequency of an impact is characterized as given below:

1. High - impact will occur continuously throughout the life of the project (e.g., impact due to movement of loading trucks, or movement of products bearing vessels along the creek to bring products to the depot);
2. Medium - impact will occur intermittently over the life of the project (e.g., removal of sludge from tanks);
3. Low - impact will occur rarely or a very limited number of times (e.g., existing structures demolition impacts).

Combining Duration with Frequency gives the Temporal Components of impacts as shown through Table 5.4 below.

**Table 5.4: Evaluation of Temporal Components of Impacts**

<b>TEMPORAL COMPONENTS OF IMPACTS</b>			
<b>FREQUENCY</b>	<b>DURATION</b>		
	<b>High</b>	<b>Average</b>	<b>Low</b>
<b>High</b>			
<b>Medium</b>			
<b>Low</b>			

**LEGEND FOR IMPACT ASSESSMENT MATRICES**

- Signifies High or Major Negative Impact;
- Signifies Medium, Moderate or Average Negative Impact;
- Signifies Low or Minor Negative Impact.

**Magnitude** – this is used here in the sense of degree, extensiveness, or scale of impact. It is measurable as it answers such questions as: how many hectares are affected? How many species are threatened? What is the volume of pollutants or percentage above the standard limit, etc?

The classification of “High”, or “Moderate”, or “Minor”, or Negligible with respect to Magnitude of Impact may vary depending on the specific receptor.

For the **Percent (Population) of Resource Affected:**

The magnitude of an impact is characterized as given below:

1. High - large amount of the resource or population is affected (over

- 40% of resource or population); easily observable and measurable effect;
2. Moderate - moderate amount of the resource or population is affected (between 10% and 39% of resource or population); generally measurable and observable effect;
  3. Minor - small amount of the resource or population is affected (between 1% and 9% of resource or population); low magnitude impact may be within the range of normal variation of background conditions;
  4. Negligible - amount of resource or population affected is unnoticeable or immeasurably small (less than 1% of resource or population).

For the **Concentration (of Pollutants) at Receptor Points**, Magnitude may be defined with respect to the quantitative or semi-quantitative criteria, if available and applicable, (e.g., concentration of Total Suspended Solids (TSS) in parts per million (ppm) measured at the Creek). The identified quantitative criteria (benchmarks) would align with standard best industry standards (e.g., for TSS, TSS limits in surface water as set by WHO). The concentration of an impact, when quantifiable, is characterized as given below:

1. High - over 40% higher than the quantitative or semi-quantitative criteria;
2. Moderate - between 10% and 39% higher than the quantitative or semi-quantitative criteria;
3. Minor - from the equivalent of quantitative or semi-quantitative benchmark to 9% above the quantitative or semi-quantitative criteria;
4. Negligible - impact not detected or at background conditions

**Areal Extent** - refers to the potential geographic coverage of an impact in respect of quantified amount of area affected. The Areal Extent may be quantified in units of area affected (e.g., square metres or hectares). The Areal Extent of an impact is characterized as given below:

1. High - impact has effect well beyond the general project environment to national, continental or even global environment;
2. Moderate - impact limited to the general vicinity of the project site or study area;
3. Low - impact limited to the immediate area of the activity or occurrence that results in the impact;

4. Negligible - impact limited to a very small part of the activity area.

Combining Magnitude with Areal Extent gives the Spatial Components of impacts as shown through Table 5.5 below.

**Table 5.5: Evaluation of Spatial Components of Impacts**

<b>SPATIAL COMPONENTS OF IMPACTS</b>			
<b>MAGNITUDE</b>	<b>AREAL EXTENT</b>		
	<b>High</b>	<b>Moderate</b>	<b>Low</b>
<b>High</b>			
<b>Moderate</b>			
<b>Minor</b>			

**LEGEND FOR IMPACT ASSESSMENT MATRICES**

- Signifies High or Major Negative Impact;
- Signifies Medium, Moderate or Average Negative Impact
- Signifies Low or Minor Negative Impact.

In order to arrive at the Overall Impact Severity Rating, we first aggregated the Temporal and Spatial Components of Impacts to arrive at the Total Scope of Impact shown through Table 5.6 below.

**Table 5.6: Evaluation of Total Scope of Impact (Combination of Temporal and Spatial Components of Impacts)**

<b>TOTAL SCOPE OF IMPACTS</b>			
<b>TEMPORAL COMPONENTS OF IMPACTS</b>	<b>SPATIAL COMPONENTS OF IMPACTS</b>		
	<b>High</b>	<b>Moderate</b>	<b>Low</b>
<b>High</b>			
<b>Moderate</b>			
<b>Low</b>			

**LEGEND FOR IMPACT ASSESSMENT MATRICES**

- Signifies High or Major Negative Impact;
- Signifies Medium, Moderate or Average Negative Impact;
- Signifies Low or Minor Negative Impact.

Combining Total Scope of Impact (Combination of Temporal and Spatial Components of Impacts) with Importance (Sensitivity of the Receptor) gives the Overall Impact Severity Rating shown in Table 5.7 below.

**Importance (Sensitivity of the Receptor)**, from the point of view of natural resources and environmental quality, - refers to economic, social, and/or environmental/ecological significance of the receptor, including reliance on the receptor by people for sustenance,

livelihood, economic activity and the inherent sensitivity of the resource, and also to the importance of direct impacts to persons associated with resource.

The sensitivity also refers to potential impacts to Environmentally Sensitive Areas (ESAs) and impacts on species, including loss of endangered species, impacts of introduction of invasive species, and similar environmental/ecological impacts. The Sensitivity of Receptor criterion is characterized as given below:

1. High - receptor is of high economic, social, and/or environmental significance and/or has an inherent sensitivity (including vulnerability and exposure to the specific impact);
2. Medium - receptor is of moderate economic, social, and/or environmental significance and is not particularly vulnerable and/or exposed to the specific impact;
3. Low - receptor is of low economic, social, and/or environmental significance and is not vulnerable and/or exposed to the specific impact;
4. Negligible - receptor is not of economic, social, and/or environmental significance and/or is insensitive to the specific impact.

**Table 5.7: Evaluation of Overall Impact Severity Rating (Combination of Total Scope of Impact and Sensitivity of Receptor)**

<b>OVERALL IMPACT SEVERITY RATING</b>			
<b>SENSITIVITY OF RECEPTOR</b>	<b>TOTAL SCOPE OF IMPACT</b>		
	<b>High</b>	<b>Moderate</b>	<b>Low</b>
<b>High</b>			
<b>Medium</b>			
<b>Low</b>			

#### **LEGEND FOR IMPACT ASSESSMENT MATRICES**

- Signifies High or Major Negative Impact;
- Signifies Medium, Moderate or Average Negative Impact;
- Signifies Low or Minor Negative Impact.

#### **5.2.2.2 Overall Impact Significance Evaluation**

To determine the Overall Significance of identified potential impacts, the Overall Impact Severity Rating is further evaluated in combination with another factor/criterion of significance. This criterion is the Impact Likelihood Criterion (the likelihood of occurrence of the impacts).

**Impact Likelihood Criterion** – this evaluates the likelihood of the impact occurring and not of the activity occurring, and it is used to determine whether negative impacts can be prevented or mitigated or if they are unavoidable.



It follows therefore that the Overall Significance of a negative environmental impact is defined by its Overall Impact Severity Rating (as earlier determined) and its likelihood of occurrence. For example, an impact with a moderate impact severity rating that has a high likelihood of occurrence would be more severe than an impact that has a major impact severity rating with a very low likelihood of occurrence. The likelihood of Occurrence of Impact criterion is characterized as given below:

1. High - High Possibility of Incidents Occurrence. In view of measures being put in place, the impact may likely occur during normal operations (impact has been known to occur routinely, though not necessarily in all similar circumstances);
2. Medium - Moderate Possibility of Incidents Occurrence. Impact may occur intermittently during normal operations, but may occur more frequently if there is a breakdown of the measures put in place (e.g., through non-functioning of anti-pollution facility); impact has been known to occur in many similar circumstances, but not routinely);
3. Low - Low Possibility of Incidents Occurrence. Impact most unlikely to occur, in view of measures being put in place (impact has been known to occur but only very rarely in similar circumstances);
4. Negligible- Unlikely Occurrence of Incidents. Occurrence of the impact is almost impossible; impact not known to have previously occurred in similar circumstances);

The Overall Impact Severity Rating and the Likelihood of Occurrence of Impacts for identified potential impacts are qualitatively evaluated to give the Overall Impact Significance as shown in Table 5.8 below.

**Table 5.8: Evaluation of Overall Impact Significance (Combination of Overall Impact Severity Rating and Likelihood of Occurrence of Impact)**

<b>OVERALL IMPACT SIGNIFICANCE</b>				
<b>LIKELIHOOD OF OCCURRENCE OF IMPACTS</b>	<b>OVERALL IMPACT SEVERITY RATING</b>			
	<b>Major</b>	<b>Average</b>	<b>Minor</b>	<b>Positive</b>
<b>High</b>				
<b>Medium</b>				
<b>Low</b>				

#### **LEGEND FOR IMPACT ASSESSMENT MATRICES**

- Signifies High or Major Negative Impact;
- Signifies Medium, Moderate or Average Negative Impact;
- Signifies Low or Minor Negative Impact.
- Signifies Beneficial (Positive) Impact.

During the evaluation, impacts that have a low likelihood of occurrence and a major overall impact severity rating are qualitatively evaluated as being of lower priority than impacts that have a high likelihood of occurrence and a minor overall impact severity rating.

Impacts that have a high likelihood of occurrence and a high overall impact severity rating are evaluated as being of the highest level of priority (e. i., high significance impacts (Red Highlight) – requiring further evaluation for management action (such as policy or design change and mitigation actions), and impacts that have a low likelihood of occurrence and minor overall impact severity rating are evaluated as being of the lowest level of concern (e. i., low-significance impacts (Green Highlight)), while impacts that have a low likelihood of occurrence and a major overall impact severity rating as well as impacts that have a high likelihood of occurrence and a minor overall impact severity rating are both rated as medium-significance impacts (Yellow Highlight).

Further to the foregoing and as earlier stated, impacts are assessed with respect to the following criteria, used in the sense given below, as to whether impacts have direct or indirect effects:

1. Direct Impacts – those that affect the receptor directly such as increased Turbidity of Coastal Water through rubbles discharge;
2. Indirect Impacts – those that are passed to the receptor through another impacted entity such as changes in sediments deposition in coastal water due to increased turbidity.

In addition, the identified impacts were assessed/evaluated for incremental effects/cumulative impacts of the proposed project implementation on the affected receptors.

The above stated criteria for Overall Impact Significance Assessment with definitions/interpretations are summarized in Table 5.9 below.

**Table 5.9: Summary of Overall Impact Significance Assessment Criteria**

EVALUATION CRITERIA	TEMPORAL COMPONENTS OF IMPACTS		SPATIAL COMPONENTS OF IMPACTS		IMPORTANCE (SENSITIVITY OF RECEPTORS)	LIKELIHOOD OF OCCURRENCE OF IMPACTS
	DURATION	FREQUENCY	MAGNITUDE	AREAL EXTENT		
IMPACT SIGNIFICANCE RATING						
<b>High or Major</b>	Long-term impact (throughout the project, or is irreversible)	Impact will occur continuously throughout the life of the project (e.g., impact due to movement of loading trucks or movement of products bearing vessels along the creek)	Large amount of the resource or population is affected (over 40% of resource or population); easily observable and measurable effect; or over 40% higher than set limit by regulatory bodies;	Impact has effect well beyond the general project environment to national, continental or even global environment;	Receptor is of high economic, social, and/or environmental significance and/or has an inherent sensitivity (including vulnerability and exposure to the specific impact;	High Possibility of Incidents Occurrence. In view of measures being put in place, the impact may likely occur during normal operations (impact has been known to occur routinely, though not necessarily in all similar circumstances);
<b>Medium or Moderate or Average</b>	Moderate-term impact (during the project operation, or is reversible only with human assistance)	Impact will occur intermittently over the life of the project (e.g., removal of sludge from tanks)	Moderate amount of the resource or population is affected (between 10% and 39% of resource or	Impact limited to the general vicinity of the project site or study area;	Receptor is of moderate economic, social, and/or environmental significance and is not particularly	Moderate Possibility of Incidents Occurrence. Impact may occur intermittently during normal operations, but may occur more

			population); generally measurable and observable effect; or between 10% and 39% higher than set limit by regulatory bodies;		vulnerable and/or exposed to the specific impact;	frequently if there is a breakdown of the measures put in place (e.g., through non-functioning of anti-pollution facility); impact has been known to occur in many similar circumstances, but not routinely);
<b>Low or Minor</b>	Short-term impact (during the project construction stage, or is reversible without the need for human assistance)	Impact will occur rarely or a very limited number of times (e.g., preconstruction activities impacts)	Small amount of the resource or population is affected (between 1% and 9% of resource or population); low magnitude impact may be within the range of normal variation of background conditions; or from the equivalent of set limit by regulatory	Impact limited to the immediate area of the activity or occurrence that results in the impact;	Receptor is of low economic, social, and/or environmental significance and is not vulnerable and/or exposed to the specific impact;	Low Possibility of Incidents Occurrence. Impact most unlikely to occur, in view of measures being put in place (impact has been known to occur but only very rarely in similar circumstances);

			bodies to 9% above it;			
<b>Negligible</b>	Recovery time is very short or immediate	Not Considered for this criteria	Amount of resource or population affected is unnoticeable or immeasurably small (less than 1% of resource or population); or indicator not detected or at background conditions	Impact limited to a very small part of the activity area.	Receptor is not of economic, social, and/or environmental significance and/or is insensitive to the specific impact.	Unlikely Occurrence of Incidents. Occurrence of the impact is almost impossible; impact not known to have previously occurred in similar circumstances);

### 5.3 Predicted Potential and Associated Impacts of the Proposed A. A. Rano Nigeria Limited's ATK Depot Project

The Important factor to consider is to assess the implementation of the proposed ATK Depot project and identify or predict all potential impacts that might arise. Irrespective of its magnitude, the rating and ranking method will be able to determine its importance in the project implementation at the particular site or environment chosen for that purpose. Therefore, the interaction of the potential impacts and the receiving environment is very important. The predicted potential impacts will also list the cumulative impacts envisaged. The predicted potential impacts are as follows:

#### 1. Climate and Air Quality

- i. Dust;
- ii.. Fumes from petroleum products;
- iii.. Gaseous emission from generators,
- iv. Vehicular emission;
- v. Noise;
- vi. Heat;
- vii. Vibration;

#### 2. Water Resources

- i. Waste water;
- ii. Oil spillage;
- iii. Oily waste water leading to the pollution of land;

#### 3. Geology, Topography and Soil

- i. Solid waste;
- ii. Metal scraps, pipes, etc;
- iii. Oil spillage;
- iv. Chemical spillages e.g scale incubators, corrosion incubators, fire fighting foams;

#### 4. Ecology

- i. Pipeline leakage;
- ii. Flooding;
- iii. Erosion;
- vi. Sewage / sanitary waste (increase BOD and reduced dissolve oxygen (DO));

#### 5. Socio-economic

- i. Traffic congestion;
- ii. Fire outbreak / explosion from products tanks;

- iii. Vehicular / tanks collision / crashes at facility;
- iv. Employment;
- v. Sewage / sanitary waste (increase BOD and reduced dissolve oxygen (DO));
- vi. Corrosion of metal tanks, pipelines, etc;
- vii. Income generation activities / trading population increases near business premises;
- viii. Thunder and lightning (safety of facility is very important to the project from natural causes);

### 5.3.1 The Cumulative Impacts Envisaged.

1. **Air Quality:** Increase in emissions from vehicles, generators and other heavy equipment; therefore, there will be additional emissions to affect **Air Quality** (NO<sub>x</sub>, CO<sub>x</sub>, SO<sub>x</sub>).
2. **Traffic (Vehicles):** Possible congestion of adjoining roads – Airport Road may be affected due to increase in number of vehicles (tankers) conveying / supplying products. Therefore, delays in distribution of products may be experienced and also safety concerns are heightened.
3. **Oil Spillage / Leaks:** Pollution index of the adjoining land will increase when added to those from other firms / industries located nearby.
4. **Solid Waste:** There will be increase in generated wastes of this category due to increase in the number of people.
5. **Noise:** There may be a slight increase in noise level in the environment from vehicles and humans.
6. **Population Increase:** The activities at the depot will involve people that will work there and those that come to buy products; therefore, additional people may be at the site.
7. **Economic Activities:** There will be additional economic activities in the area due to the citing of the depot.

## 5.4 IMPACT ANALYSIS

In this section of the report, analysis of associated and potential impacts of pre-construction, construction and operation activities in relation to the proposed A. A. Rano Nigeria Limited's ATK Depot Facility Project is presented in Table 5.10 below.



**Table 5.10: Impact Analysis of Proposed A. A. Rano Nigeria Limited's ATK Depot Facility Project**

Project Activities ↓	Associated/ Potential Impacts	Impact Characterization	Overall Impact Severity Rating	Likelihood of Impact Occurrence	Overall Impact Significance
Site Preparation	<p><b>a. Air Quality and Noise:</b></p> <p>i. Air Pollution as a result of SO<sub>2</sub>, CO, SPM, etc., into the atmosphere from equipment, etc.</p> <p>ii. Noise from equipment will be intermittent, but will increase the background noise level.</p>	<p>a. Direct; Adverse Residual; Short term; Normal.</p>	Minor	Low	Low
<p><b>Activities Involved:</b></p> <ul style="list-style-type: none"> <li>- Sand Filling the site;</li> <li>- Soil Conditioning and Stabilization;</li> <li>- Geotechnical Surveys for Tank Farm construction Installation Suitability;</li> <li>- Interior Route Preparation, Excavation, Debris Disposal, etc.</li> </ul>	<p><b>b. Water Quality and Hydrobiology:</b></p> <p>i. Accidental oil spill during fuelling of equipment that may affect ground water.</p>	<p>b. Direct; Moderate; Adverse;</p>	Average	Low	Low
	<p><b>c. Transportation</b></p> <p>i. The Heavy equipment movement during mobilization to site may affect traffic in the study area</p>	<p>d. Direct; Adverse; Short term; Normal;</p>	Average	Low	Low
	<p><b>d. Accidental Occurrences and Health:</b></p> <p>i. Workplace accidental incidences;</p>	<p>e. Adverse; Major; Short terms</p>	Major	Low	Moderate

<b>Construction</b>	<b>a. Air Quality:</b> i. Air pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from construction equipment, vehicles, etc.	g. Adverse; Short term; Cumulative	<b>Minor</b>	<b>Medium</b>	<b>Low</b>
	<b>b. Health and Safety:</b> i. Work place accidental incidents during loading and off loading of materials / equipment.	a. Direct; Adverse Residual; Short term; Normal.	<b>Minor</b>	<b>Low</b>	<b>Low</b>
<b>Activities Involved:</b> - Mobilization of men and equipment to site; - Foundations (Tanks, Buildings, Pump Sheds, Bund walls, Separators, Loading Bay, etc.); - Erection of Office Building, MMC & Control Room; - Construction of Loading Bay; - Construction of Interior Route and Trucks Park; - Fabrication of Product Tanks, Firewater Tank, Slop Tanks, Foam Tanks & other Fire Fighting Systems; - Construction of Oil/Water Separator and Drains; - Sinking Monitoring Wells; - Construction of Water and Wastewater Treatment Plants; - Procurement & installation of the various Pumps; - Piping Fabrication as per MFD's and line list;	b. (ii). Loud noise at project site leading to hearing problem.	b. (i). Direct; Adverse Residual; Short term; Normal	<b>Average</b>	<b>Low</b>	<b>Low</b>
	<b>c. Transportation:</b> c. (i). Movement of construction equipment and vehicular movement that could increase / obstruct the traffic situation on Airport Road	b. (ii). Direct; Residual; Short term; Normal.	<b>Minor</b>	<b>Medium</b>	<b>Low</b>
	<b>d. Spillage / leakage / fumes</b>	c. (ii). Minimal; Short term.	<b>Minor</b>	<b>Low</b>	<b>Low</b>
	<b>e. Fire/Explosion</b>	d (i). Adverse; Short term	<b>Average</b>	<b>Moderate</b>	<b>Moderate</b>
	<b>f. Waste Management:</b> Wastes to be generated will include:	e. Cumulative; Direct; Residual	<b>Minor</b>	<b>Medium</b>	<b>Low</b>






<ul style="list-style-type: none"> <li>- Procurement and Installation of Cablings, switches and controls to all electrical drives and lights;</li> <li>- Procurement &amp; Installation of all Instrumentation Equipment;</li> <li>- Procurement &amp; Installation of SCADA System;</li> </ul>	<ul style="list-style-type: none"> <li>i. Metal cuttings;</li> <li>ii. Packaging materials</li> <li>iii. Hazardous wastes such as anti-corrosion chemicals and paints;</li> <li>iv. Empty drums and tins;</li> <li>v. Welding electrode butts;</li> <li>vi. Toileting Activities.</li> </ul>				
<p><b>Operation</b></p>	<p><b>a. Air Quality and Noise:</b> Impact from:</p> <ul style="list-style-type: none"> <li>i. Fugitive emissions from stored petroleum product;</li> <li>ii. Combustion exhausts from products pumps, power generators, and road tanker trucks, thereby reducing the quality of air in the area.</li> <li>iii. Noise from various equipment will be intermittent, but will increase the background noise level.</li> </ul>	f. Direct; Cumulative	<b>Minor</b>	<b>Low</b>	<b>Low</b>
	<p><b>b. Water Quality and Hydrobiology:</b></p> <ul style="list-style-type: none"> <li>i. Accidental oil spill during loading and off-loading of products.</li> </ul>	g. Adverse; Cumulative	<b>Minor</b>	<b>Low</b>	<b>Low</b>

<b>Activities Involved:</b> - Receiving ATK from Tank Trucks; - Storing the ATK; - Loading and delivering the above stated product to refuellers towards fuelling of aircrafts;	<b>c. Transportation:</b> i. Heavy vehicular movement (tankers and trucks) along the Road (more than 20 trucks per day)	i. Adverse; Cumulative; Medium term; Normal	<b>Average</b>	<b>low</b>	<b>Low</b>
	<b>e. Accidental Occurrences:</b> i. Rupture of product Tanks / pipelines; iii. Fire and Explosions at the Tank Farm; iv. Work place accidental incidence.	a. Adverse; Cumulative; Continuous; Long-term	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
	<b>f. Waste Management:</b> Wastes to be generated will include:				
	<b>f (1) Solid Wastes Generation:</b> i. Damaged seals ii. Oil stained rags, sand and wood shavings / sawdust iii. Papers from the offices (iv. Sweepings from the compound	f. Moderate; Adverse; Cumulative	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
	<b>f (2) Liquid Wastes Generation:</b> i. Floors washing (ii. Run-off	f. Moderate; Adverse; Cumulative	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
	<b>f (3) Oil Wastes Generation:</b>	f. Moderate; Adverse; Cumulative	<b>Average</b>	<b>Medium</b>	

	<p>i. As spillage/leakage during products reception and pump house activities</p> <p>ii. As spillage/leakage from diesel tanks and generator houses</p> <p>iii. As spillage/leakage from filling machines and also pallet trucks</p> <p>(iv. As spillage during collection and containerization of used oils and solvents/storage</p>				
<b>DECOMMISSIONING &amp; ABANDONMENT</b>	<b>a. Wastes:</b> scrap materials arising from decommissioned buildings/tanks / pipelines;	b. Moderate; Adverse; Cumulative	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
	<b>b.</b> Workplace accidents / incidents.	c. Adverse; Short term; Cumulative.	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
	<b>c. Air Quality:</b> Air pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from demolition equipment, vehicles, etc.	d. Adverse; Short term	<b>Average</b>	<b>High</b>	<b>Moderate</b>
	<b>d. Water Resources:</b> Accidental discharge of oil and solid	e. Adverse; Major; Short terms	<b>Major</b>	<b>Low</b>	<b>Moderate</b>
	<b>e. Transportation:</b> Interference with other road users	f. Adverse; Long term	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>

	due to traffic of moving crew, equipment, rubbles and scraps.				
		a. Adverse; Cumulative; Short time;	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
<b>Activities Involved:</b> - Staffs Disengagement; - Controlled Demolition of Existing Structures; - Clearing, Sorting/Separation of removed Materials; - Storage, Sale, or Disposal of removed Materials.		b. Adverse Cumulative; Short time.	<b>Average</b>	<b>Medium</b>	<b>Moderate</b>
		c. Direct; Adverse Residual; Short term; Normal.	<b>Minor</b>	<b>Low</b>	<b>Low</b>
		d. Direct; Adverse Cumulative; Short term;	<b>Average</b>	<b>Low</b>	<b>Low</b>
		e. Direct; Adverse Cumulative; Short term; Normal	<b>Minor</b>	<b>Low</b>	<b>Low</b>

**IMPACT ASSESSMENT MATRICES**

-  Signifies High Negative Impact;
-  Signifies Moderate Negative Impact;
-  Signifies Low Negative Impact;
-  Signifies Beneficial (High - Positive) Impact
-  Signifies Beneficial (Moderate - Positive) Impact

## CHAPTER SIX

### **6.0 MITIGATION MEASURES**

#### **6.1 Introduction**

This chapter covers the mitigation of the potential impacts presented in chapter five (5) of this report. Mitigation measures are used to either eliminate or reduce the risk (s) associated with the occurrence of the potential negative impacts of the proposed ATK depot project. All the mitigation measures listed in this chapter are being included at the front-end design of this project.

#### **6.2 Implementation of Mitigation Measures**

The implementation measures presented in this section of this EIA report are tailored to the identified impacts in relation to the different project activities.

The mitigation measures have been set based on logistic, operational, technological/technical and financial input considerations working within the framework of Best Available Technology Not Exceeding Excessive Cost (BATNEEC) with the sole aim of reducing adverse impacts to As Low As Reasonably Practicable (ALARP).

While some measures are planned for the commencement of the project implementation, other most especial within the Major and Moderate Adverse categories are already being implemented.

Table 6.1 below presents, the various impact types and the proposed mitigation measures.

**Table 6.1: Proposed Mitigation Measures for Significant Impacts for the Proposed A. A. Rano Nigeria Limited's ATK Depot Facility Project**

Project Activities ↓	Associated/ Potential Impacts	Impact Characterization	Overall Impact Significance	Mitigation Measures	Residual Impact Rating
<b>Site Preparation</b>	<b>a. Air Quality and Noise:</b> i. Air Pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from equipment, etc. ii. Noise from equipment will be intermittent, but will increase the background noise level.	a. Direct; Adverse Residual; Short term; Normal.	<b>Low</b>	. i. All equipment used will be in excellent operating conditions and workers will be equipped with appropriate protective gears. ii. All equipment will be fitted with necessary antipollution components; iii. A. A. Rano Nigeria Ltd will adopt “switch off engine policy” for any equipment/machine not in use; iv. Use of appropriate PPEs such as Ear Muffs and Nose Masks shall be enforced at all times, where required.	<b>Low</b>
<b>Activities Involved:</b> - Sand Filling the site; - Soil Conditioning and Stabilization; - Geotechnical Surveys for Tank Farm construction Installation Suitability; - Interior Route Preparation, Excavation, Debris Disposal, etc.	<b>b. Water Quality and Hydrobiology:</b> i. Accidental oil spill during fuelling of equipment that may affect ground water.	b. Direct; Moderate; Adverse;	<b>Low</b>	i. All necessary measures shall be undertaken to prevent spillage, should it however occur, the affected areas will be cordoned off while necessary mop up operations shall be undertaken;	<b>Low</b>
	<b>c. Transportation</b> i. The Heavy equipment movement during mobilization to site may affect traffic in the study	d. Direct; Adverse; Short term; Normal;	<b>Low</b>	i. Movement of equipment to site shall be done during off peak hours;	<b>Low</b>



	area				
	<p><b>d. Accidental Occurrences and Health:</b></p> <p>i. Workplace accidental incidences;</p>	e. Adverse; Major; Short terms	<b>Moderate</b>	<p>i. A. A. Rano Nigeria Ltd will adhere strictly to safety precautions.</p> <p>iv. Emergency Response Action Plan is being put in place by A. A. Rano Nigeria Ltd</p>	<b>Low</b>
<b>Construction</b>	<p><b>a. Air Quality:</b></p> <p>i. Air pollution as a result of SO<sub>2</sub>, CO, SPM, etc., into the atmosphere from construction equipment, vehicles, etc.</p>	g. Adverse; Short term; Cumulative	<b>Low</b>	<p>a. i. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears.</p> <p>ii. During dry periods, vehicles moving to and from the site will be restricted to operate at speed of less than 10 km/hour;</p> <p>iii. Water shall be sprayed on loose open soil around the construction area during dry season.</p>	<b>Low</b>
	<p><b>b. Health and Safety:</b></p> <p>i. Work place accidental incidents during loading and off-loading of materials / equipment.</p>	a. Direct; Adverse Residual; Short term; Normal.	<b>Low</b>	b. i. A. A. Rano Nigeria Ltd shall adhere strictly to safety precautions.	<b>Low</b>
<p><b>Activities Involved:</b></p> <p>- Mobilization of men and equipment to site;</p>	b. (ii). Loud noise at project site leading to hearing problem.	b. (i). Direct; Adverse Residual; Short term; Normal	<b>Low</b>	b. ii. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears;	<b>Low</b>

<ul style="list-style-type: none"> <li>- Foundations (Tanks, Buildings, Pump Sheds, Bund walls, Separators, Loading Bay, etc.);</li> </ul>				<ul style="list-style-type: none"> <li>iii. Wherever feasible, equipment shall be fitted with silencers and acoustic mufflers.</li> </ul>	
<ul style="list-style-type: none"> <li>- Erection of Office Building, MMC &amp; Control Room;</li> <li>- Construction of Loading Bay;</li> <li>- Construction of Interior Route and Trucks Park;</li> <li>- Fabrication of Product Tanks, Firewater Tank, Slop Tanks, Foam Tanks &amp; other Fire Fighting Systems;</li> <li>- Construction of Oil/Water Separator and Drains;</li> <li>- Sinking Monitoring Wells;</li> </ul>	<p><b>c. Transportation:</b> c. (i). Movement of construction equipment and vehicular movement that could increase the traffic situation on Airport Road</p>	<p>b. (ii). Direct; Residual; Short term; Normal.</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>Movement of equipment to site shall be timed to ensure that it does not interfere with normal traffic.</li> <li>Movement to be done very early in the morning or late at night</li> </ul>	<p><b>Low</b></p>
<ul style="list-style-type: none"> <li>- Construction of Water and Wastewater Treatment Plants;</li> <li>- Procurement &amp; installation of the various Pumps;</li> <li>- Piping Fabrication as per MFD's and line list;</li> <li>- Procurement and Installation of Cablings, switches and controls to all electrical drives and lights;</li> </ul>	<p><b>d. Spillage / leakage /fumes</b></p>	<p>c. (ii). Minimal; Short term.</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>i. All necessary measures shall be undertaken to prevent spillage, should it however occur, the affected areas will be cordoned off while necessary mop up operations shall be undertaken</li> </ul>	<p><b>Low</b></p>
<ul style="list-style-type: none"> <li>- Procurement &amp; Installation of all Instrumentation Equipment;</li> <li>- Procurement &amp; Installation of SCADA System;</li> </ul>	<p><b>e. Fire/Explosion</b></p>	<p>d (i). Adverse; Short term</p>	<p><b>Moderate</b></p>	<ul style="list-style-type: none"> <li>f. i. A. A. Rano Nigeria Ltd shall adhere strictly to safety precautions;</li> <li>ii A. A. Rano Nigeria Ltd is already putting in place an Emergency Response Plan and shall be religiously adhered to by the Company;</li> <li>iii. A. A. Rano Nigeria Ltd has a standing arrangement with Federal / Territorial Fire Services for additional help in preparedness for eventualities as part of the emergency</li> </ul>	<p><b>Low</b></p>

				provisions.	
	<p><b>f. Waste Management:</b> Wastes to be generated will include:</p> <ul style="list-style-type: none"> <li>i. Metal cuttings;</li> <li>ii. Packaging materials</li> <li>iii. Hazardous wastes such as anti-corrosion chemicals and paints;</li> <li>iv. Empty drums and tins;</li> <li>v. Welding electrode butts;</li> <li>vi. Toileting Activities.</li> </ul>	e. Cumulative; Direct; Residual	<b>Low</b>	<p>g. i. The affected areas will be barricaded so as to control the movement of materials in addition to appropriate measures for shoreline protection;</p> <p>ii. Materials shall be sorted for ease of reuse, and possible recycling prior to environmentally safe disposal of others.</p>	<b>Low</b>
<b>Operation</b>	<p><b>a. Air Quality and Noise:</b> Impact from:</p> <ul style="list-style-type: none"> <li>i. Fugitive emissions from stored petroleum product;</li> <li>ii. Combustion exhausts from products pumps, power generators, and road tanker trucks, thereby reducing the quality of air in the area.</li> <li>iii. Noise from various equipment will be</li> </ul>	f. Direct; Cumulative	<b>Low</b>	<p>a. i.. All flanges and vents shall be properly tightened to minimize fugitive emissions.</p> <p>ii. All systems shall be regularly checked to ensure that there are no leakages and losses.</p> <p>iii. All machinery, equipment and vehicles to be used for the project shall have high efficiency rating to reduce impact on air quality and noise.</p> <p>iv. Mufflers / silencers shall be put in the exhaust pipes to reduce noise.</p> <p>v. Tanks cooling with water and proper</p>	<b>Low</b>

	intermittent, but will increase the background noise level.			aeration shall be undertaken regularly.  vi. Should there be any incidence that could affect the source of drinking water, alternative source of drinking water shall be provided for the local/affected communities; this could include the sinking of borehole and provision of water treatment plant.	
	<p><b>b. Water Quality and Hydrobiology:</b></p> <p>i. Accidental oil spill during loading and off-loading of products.</p>	g. Adverse; Cumulative	Low	<p>b. i. A. A. Rano Nigeria Ltd shall adhere strictly to best practice in ensuring that oil spillage is avoided.</p> <p>ii. All water flows around the premises of the depot shall be channelled into the Oil-Water Separator being designed along with this project;</p> <p>iii. Should there be any incidence that could affect the source of drinking water, alternative source of drinking water shall be provided for the local/affected communities;</p>	Low
<p><b>Activities Involved:</b></p> <ul style="list-style-type: none"> <li>- Receiving ATK from Tank Trucks;</li> <li>- Storing the ATK;</li> <li>- Loading and delivering the above stated product to refuellers towards fuelling of</li> </ul>	<p><b>c. Transportation:</b></p> <p>i. Heavy vehicular movement (tankers and trucks) along the Road (more than 20 trucks per day)</p>	i. Adverse; Cumulative; Medium term; Normal	Low	<p>c. i. A Trucks Withholding Bay to hold about twenty (20) trucks within the proposed depot is planned along with the proposed project</p> <p>ii. In addition, there is plan to collaborate with other investors in the area</p>	Low

aircrafts;	<p><b>e. Accidental Occurrences:</b></p> <p>i. Rupture of product Tanks / pipelines;</p> <p>iii. Fire and Explosions at the Tank Farm;</p> <p>iv. Work place accidental incidence.</p>	a. Adverse; Cumulative; Continuous; Long-term	<b>Moderate</b>	<p>i. Adequate oil spill response equipment shall be provided within the Tank Farm premises;</p> <p>ii. Bund walls shall be built round each product tank in case of product tank rupture;</p> <p>iii. A firewater tank of over 301m<sup>3</sup> and a tank foam pouring system shall be provided on site to automatically be deployed in case there is a fire incident.</p> <p>iv. A. A. Rano Nigeria Ltd has a standing arrangement with Federal / Territorial Fire Services for additional help in preparedness for eventualities as part of the emergency provisions.</p> <p>v. Emergency Response Action Plan is already being put in place and shall be religiously adhered to by A. A. Rano Nigeria Ltd;</p> <p>vi. All refuellers coming to load at the depot shall be mandated to compulsorily have Spark Arrestors installed</p> <p>vii. Lightning Arrestors shall be installed on the Product Tanks and other structures within the proposed depot for prevention purposes.</p>	<b>Low</b>
<p><b>f. Waste Management:</b> Wastes to be generated will include:</p>					
	<p><b>f (1) Solid Wastes Generation:</b></p>	f. Moderate;	<b>Moderate</b>		<b>Low</b>

	<p>i. Damaged seals</p> <p>ii. Oil-stained rags, sand and wood shavings / sawdust</p> <p>iii. Papers from the offices</p> <p>(iv. Sweepings from the compound</p>	<p>Adverse; Cumulative</p>		<p>i. Segregation of wastes according to types, into dedicated / colour coded bins shall be undertaken</p> <p>ii. A secure solid wastes dump to store the waste bins shall be implemented</p> <p>iii. Disposal of solid wastes shall be done through Government Accredited Contractors</p>	
	<p><b>f (2) Liquid Wastes Generation:</b></p> <p>i. Floors washing</p> <p>(ii. Run-off</p>	<p>f. Moderate; Adverse; Cumulative</p>	<p><b>Moderate</b></p>	<p>i. All run-off and floor washing water shall be channelled into the Oil-Water Separator (OWS) for treatment before eventual discharge</p> <p>ii. Monitoring shall be implemented</p> <p>iii. The OWS discharges shall be ensured to conform to set limits</p>	<p><b>Low</b></p>
	<p><b>f (3) Oil Wastes Generation:</b></p> <p>i. As spillage/leakage during products reception and pump house activities</p> <p>ii. As spillage/leakage from diesel tanks and generator houses</p> <p>iii. As spillage/leakage from filling machines and also pallet trucks</p> <p>(iv. As spillage during collection and containerization of used oils</p>	<p>f. Moderate; Adverse; Cumulative</p>	<p><b>Moderate</b></p>	<p>i. Adequate efforts shall always be made to avoid the spillage of oil around the premises</p> <p>ii. The waste oil that may result from periodic servicing of electricity generators shall be stored in drums prior to disposal</p> <p>iii. All drains and runoffs shall be channelled into the Oil-Water Separator (OWS) to prevent oil laden water flowing into the lagoon</p> <p>iv. Spill Prevention Countermeasure and Control (SPCC) Plan is already been put in place</p> <p>v. The SPCC Plan shall be strictly adhered to</p>	<p><b>Low</b></p>

	and solvents/storage			vi. The OWS shall be constructed and operated to give the possible discharge.	
<b>DECOMMISSIONING &amp; ABANDONMENT</b>	<b>a. Wastes:</b> scrap materials arising from decommissioned buildings/tanks / pipelines;	b. Moderate; Adverse; Cumulative	<b>Moderate</b>	a. i. Scrap materials from the installations shall be thoroughly cleaned, detoxified and treated by professionally equipped contractors before scraping; ii. Wastes / scrap materials shall be sold; those that could not be sold shall be contracted out to Government Licensed waste disposal outfits for proper disposal. iii. A. A. Rano Nigeria Ltd shall Restore the land to its original form.	<b>Low</b>
	<b>b.</b> Workplace accidents / incidents.	c. Adverse; Short term; Cumulative.	<b>Moderate</b>	b. A. A. Rano Nigeria Ltd shall adhere strictly to safety precautions.	<b>Low</b>
	<b>c. Air Quality:</b> Air pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from demolition equipment, vehicles, etc.	d. Adverse; Short term	<b>Moderate</b>	c. i. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears. ii. Being a commercial/high activity area, demolition exercise will be undertaken during the working hours when the noise level differential will be relatively insignificant; iii. To reduce the Suspended Particulate Matter (SPM) concentration, the site and access road will be watered intermittently	<b>Low</b>

				during the carting away of the rubbles from demolition;	
	<b>d. Water Resources:</b> Accidental discharge of oil and solid	e. Adverse; Major; Short terms	<b>Moderate</b>	d. i. The affected areas will be barricaded so as to control the movement of materials; ii. A. A. Rano Nigeria Ltd shall adhere strictly to best practice in ensuring that oil spillage is avoided. iii. All water flows around the premises of the proposed depot shall be channelled into the Oil-Water Separators planned along with the proposed project; iv. A. A. Rano Nigeria Ltd shall Restore the land to its original form	<b>Low</b>
	<b>e. Transportation:</b> Interference with other road users due to traffic of moving crew, equipment, rubbles and scraps.	f. Adverse; Long term	<b>Moderate</b>	e. Movement of equipment to site shall be timed to ensure that it does not interfere with normal traffic. Movement to be done very early in the morning or late at night. f. A. A. Rano Nigeria Ltd shall adhere strictly to safety precautions.	<b>Low</b>
		a. Adverse; Cumulative; Short time;	<b>Moderate</b>		<b>Low</b>
<b>Activities Involved:</b> - Staffs Disengagement; - Controlled Demolition of Existing Structures; - Clearing, Sorting/Separation of removed Materials;		b. Adverse Cumulative; Short time.	<b>Moderate</b>		<b>Low</b>
		c. Direct; Adverse Residual; Short	<b>Low</b>		<b>Low</b>



Storage, Sale, or Disposal of removed Materials.		term; Normal.		
		d. Direct; Adverse Cumulative; Short term;	Low	Low
		e. Direct; Adverse Cumulative; Short term; Normal	Low	Low

## CHAPTER SEVEN

### 7.0 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

#### 7.1 GENERAL

An Environmental Management Plan (EMP) is a management tool that gives the minimum standard for environmental protection. Compliance with legislation is only acceptable as the barest minimum objective. The Environmental Management Plan (EMP) presents the strategies and procedures for managing potential environmental impacts associated with the implementation of the proposed project. A. A. Rano Nigeria Limited recognizes that a good effective EMP not only protects and minimizes potential adverse environmental consequences but minimizes potential commercial risk. Therefore, A. A. Rano Nigeria Limited and its subcontractors shall undertake to manage the environmental activities during all the project phases and its normal business practices.

The implementation of the Environmental Management Plan (EMP) is of primary importance in ensuring that all environmental issues are comprehensively addressed during the project life cycle and that all project decisions are justified with due regard to their implications on the environment. The EMP shall serve the long - term objectives of ensuring environmental compliance with legislation, achieving, enhancing and demonstrating sound environmental performance.

#### 7.2 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The overall objective of the EMP of the A. A. Rano Nigeria Limited's Tank Farm for refined liquid petroleum products is to make sure that the potential impacts of the proposed project as predicted on the environment are reduced to the barest minimum or eliminated.

**These objectives shall be achieved by:**

1. Ensuring compliance with existing legislation on protection of the environment;
2. Integrating environmental issues fully into the project development and operational phases;
3. Promoting environmental awareness among workers;
4. Rationalizing and streamlining existing environmental activities to add value to efficiency and effectiveness;
5. Providing standards for overall planning, operation, and audit;

6. Promote project sustainability through of environmentally sound procedures.

The EMP shall be further pulled into a stand-alone document through a dynamic working tool to be revised and updated throughout the A. A. Rano Nigeria Limited's Project Life Span in line with relevant environmental status, guidelines and policies.

### 7.3 Air Quality

Areas in the vicinity of the site could potentially be impacted by dust and other emissions from construction equipment.

The site will be buffered by the creek on the south, by open lands prior to any receptors on its east, west and north sides.

### 7.4 Groundwater Quality

Groundwater could potentially be contaminated by the discharge of untreated wastewater through the base of the wastewater treatment ponds / lagoons and API Separators.

The wastewater treatment ponds and API separators will be lined with an impervious membrane to produce discharge of untreated wastewater to groundwater.

### 7.5 Solid Waste

Improper management of solid wastes from the depot operations can result in soil, surface water and groundwater contamination.

Solid wastes would be generated from the petroleum handling operations, and wastewater treatment. Refined liquid petroleum products would be kept in storage tanks before transport off-site. Storage tank bottoms would be a mixture of iron rust from corrosion, sand, water, and emulsified oil and wax. Storage tank bottoms consisting primarily of water and oil emulsions would be drawn off periodically to prevent their continued build-up.

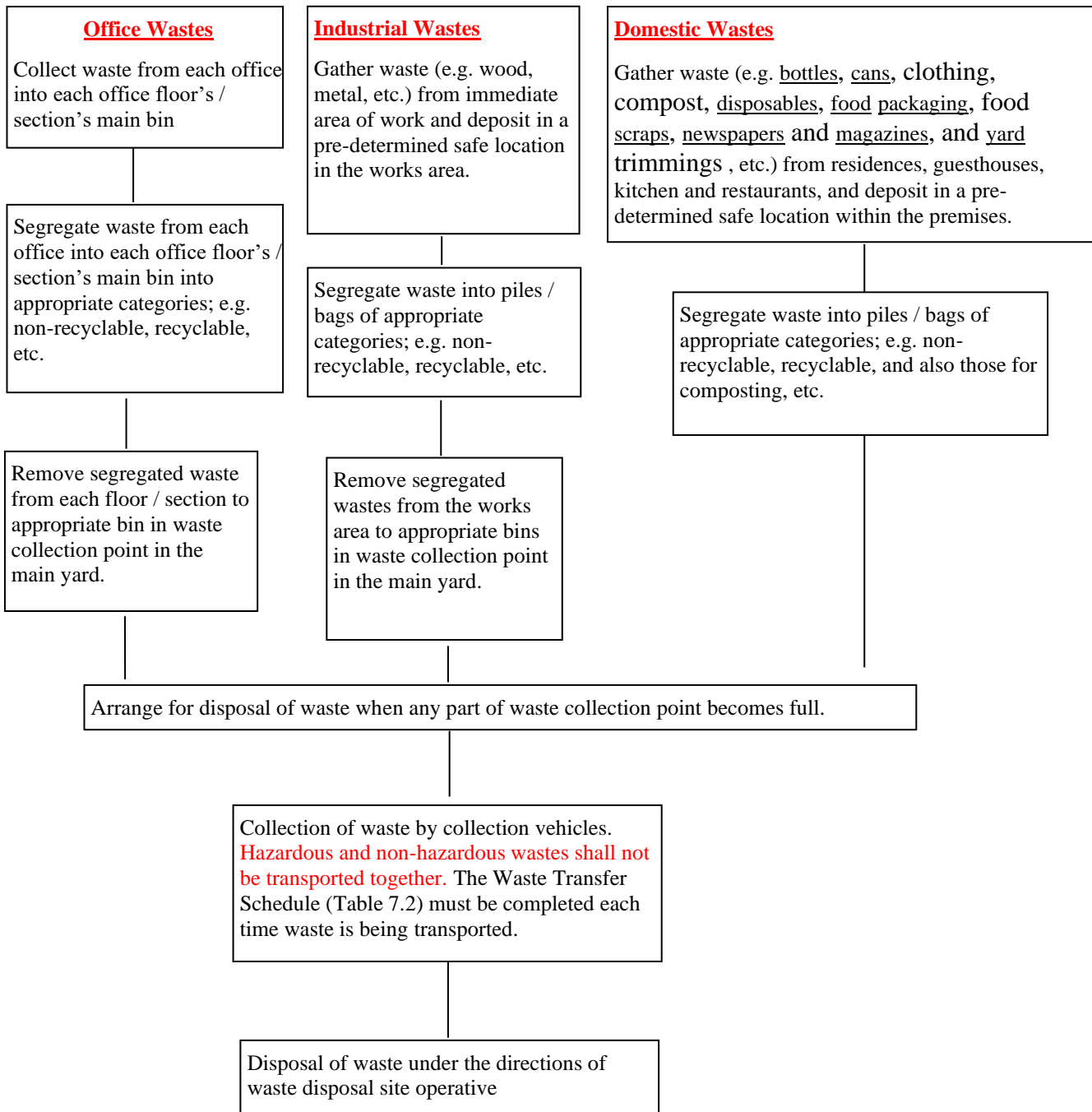
In summary, most of the solid wastes from this facility will involve solids containing oil, lead batteries, office waste materials (trash and garbage). These will be sorted at source by segregation into containers labelled to indicate the type of waste each will handle. Approved Territorial/Local Government licensed contractors, wastes handlers, will collect and handle such solid wastes. Tables 7.1a and 7.1b below, show how the wastes shall be segregated according to their respective classifications; and Figure 7.1, below, shows A. A. Rano Nigeria Limited's Fuel Depot Wastes Management Flowchart.

**Table 7.1a: Non-Hazardous Waste**

Description	Source	Action	Bin Colour
Paper Polythene bags packaging materials	Office Work – general packaging	Segregate; Keep in general waste bin	<b>Black</b>
Tin cans	Kitchen	Segregate; Keep in waste plastics bin	<b>Brown</b>
Glass	Bottles/jars/fluorescent tube; cups/plates	Segregate; Keep in waste glass bin	<b>Black</b>
Food waste	Canteens	Keep in waste food bin	<b>Green</b>

**Table 7.1b: Hazardous Waste**

Description	Source	Action	Bin Colour
Photocopy/printer cartridges'	Office work – plotters/printers	Return to store in original carton	N/A – E-Waste
Paint	Containers of marking paint	Segregate; keep in waste liquid bin	<b>Red</b>
Sanitary Waste	Sewage	Return in septic tank; Collection by authorized contractors.	<b>N/A – Medical Waste</b>
Medical Waste	Biological and clinical waste	Secure in clearly labelled clinical waste bags; Authorized contractors to collect and incinerate/dispose.	<b>Yellow</b>
Used Oil	Generator maintenance	Collected in used engine oil tank; Authorized Contractors to collect.	<b>N/A</b>
Exhaust emissions	Vehicle, generator and vessel exhaust gases	Minimize journeys and vehicle use; regular maintenance schedule; No unnecessary engine idling.	<b>N/A</b>
Batteries	Portable/personal electrical equipment	Segregate in waste battery bin.	<b>Red</b>
Aerosol	Insecticides – Air fresheners	Segregate in waste aerosol can bin.	<b>Red</b>
Diesel and Oil (run off)	Run off from car wash area	API separator to contain oil/fuel; Disposal of skimmed oil through Authorized Contractors.	<b>N/A</b>
Paint-stained metal rusts	Cleaning of interior of petroleum product tanks	Segregate; Secure in clearly labelled hazardous waste bags; Authorized contractors to collect and incinerate/dispose.	<b>Red</b>
Tank Sump Waste	Liquid Petroleum Products sediments at storage tank bases' dislodgements	Collect in used oil tanks; Authorized contractors to collect and incinerate/dispose.	<b>N/A</b>



**Figure 7.1: A. A. Rano Nigeria Limited's Fuel Depot Wastes Management Flowchart**

**Table 7.2: A. A. Rano Nigeria Limited's Fuel Depot Waste Transfer Schedule**

Sheet Number: -----

S/N	Description of Waste (State whether hazardous or non-hazardous)	Quantity (Bags/Pieces/Litres/Kilogrammes)	Removed	Remarks
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
<b>Time &amp; Date of Collection:</b>				
<b>Destination of Waste:</b>				
<b>Name of Contactors:</b>				
<b>Vehicle Registration Number:</b>				
<b>Name &amp; Signature of A. A. Rano Nigeria Limited's Fuel Depot representative:</b>				

## 7.6 Leaks and Explosions

Leaks of refined petroleum products from pipelines could potentially result in fire and / or explosions and threaten the safety and health of residents in areas surrounding the depot.

The Tank Farm site will be buffered from surrounding areas and all components of the depot, which can potentially create explosion or fire risks will be sited towards the interior of the site and away from the site boundaries. Workers will be trained to recognize and report leaks and an automated system will be used to monitor pipelines, valves, pumps, etc, for leaks. A detailed maintenance programme will be implemented to monitor the integrity of pipelines, valves, pumps, etc, to ensure the integrity of these structures. A hazard Assessment will be conducted of the fuel depot immediately after the completion of construction and prior to the commencement of operations.

## 7.7 Employee Training Programmes

Improperly trained employees can potentially increase the risks associated with catastrophic events occurring during depot operations.

Management commitment and employee participation are vital components of a successful pollution prevention programme.

Management has a commitment to pollution prevention and shall encourage employee participation by enforcement of an effective pollution prevention programme through the following:

1. Training employees in pollution prevention techniques;
2. Encouraging employee suggestions;
3. Providing incentives for employee participation;
4. Providing resources necessary to attain pollution prevention objectives.

## 7.8 OIL SPILL CONTINGENCY PLAN

In all emergency situations including petroleum products spill, protection of human life is of paramount importance. Protection of the environment is the next priority followed by protection of facilities, assets and revenue and its contractors. The emergency situation in case of spillages both on land or sea will be communicated to all staff or contractors to A. A. Rano Nigeria Limited to take the following steps: -

1. Assess the site for hazards;
2. Call for back-up;
3. Remove ignition sources;
4. Secure area to protect workers;
5. Gather information and record your actions;
6. Notify immediate most senior employee on site;
7. Activate or commence deployment of spill response procedures;
8. Monitor safety of containment and recovery operations.

However, because the consequences and impacts of spills can sometimes be difficult to predict because of wind, waves and other environmental forces, which can affect response

efficiency, A. A. Rano Nigeria Limited and its contractors shall place significant emphasis on prevention.

Prevention commences at the design stage of a project. It is most efficient and cost-effective way to eliminate any source of pollution through design. For any potential source of pollution that cannot be eliminated at the design stage, alternative methods are employed.

Operating procedures, training programme, post construction audit, containment measures and/or more frequent inspection or audit can be employed.

Awareness of the impacts of chronic and accidental oil spillage shall be communicated to all employees, as is the importance of good housekeeping as an indicator of the attention the company pays to the environment. The regulators would also be notified.

**Pipe Leakage:** If leakage occurs from pipeline, valve, hose or connector, the operation through that piping shall either be stopped or diverted immediately until the cause is ascertained and the defect repaired or remedied. If there is no alternative, piping, the operation shall then be stopped totally and immediately. If it is a pipeline or hose burst, all operations shall be stopped immediately.

**Tank/tankers overflow:** If there is a tank or vehicle tanker overflow, all loading/supply operations shall be stopped immediately for clean-up.

## **LOADING/SUPPLY OF TANK FARM BY TRUCKS**

The loading/supply/filling of the tank farm shall be suspended when:

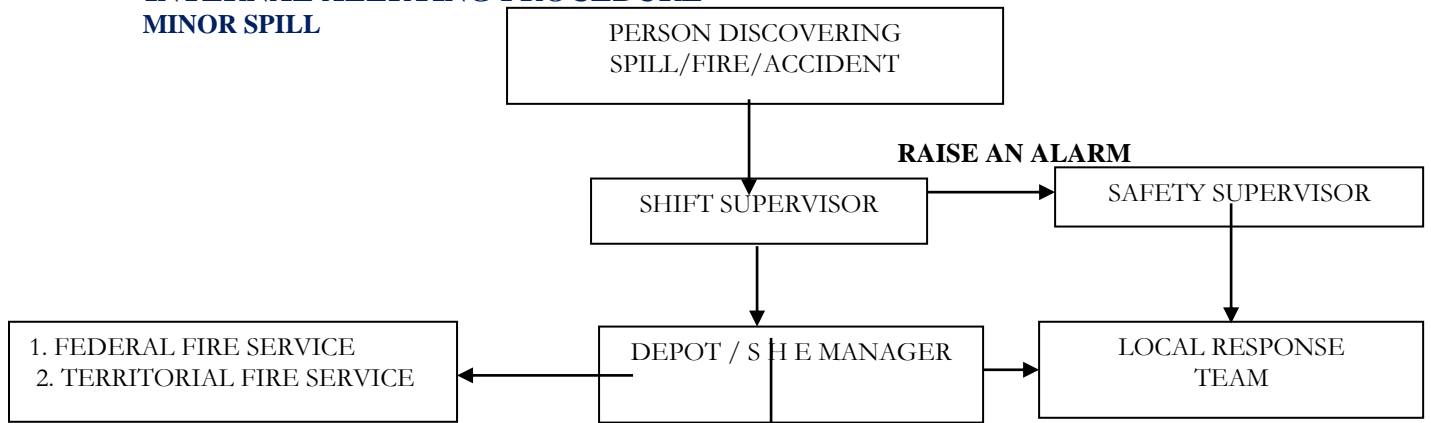
1. The wind conditions exceed the permissible limits for safe operations;
2. There is a power failure;
3. There is an interruption in the communication system;
4. There is an escape, leak or spill of petroleum products;
5. There is any storage tank or vehicle tanker damage threatening the escape of petroleum products, or a fire or damage of a fire.

Operation shall resume only after appropriate steps and actions have been taken to remedy the situation after due investigation.

Figures 7.2a and 7.2b, below show the flowcharts for Internal/External Alerting Procedure for Oil Spill and Internal/External Alerting Procedure for Fire, respectively.

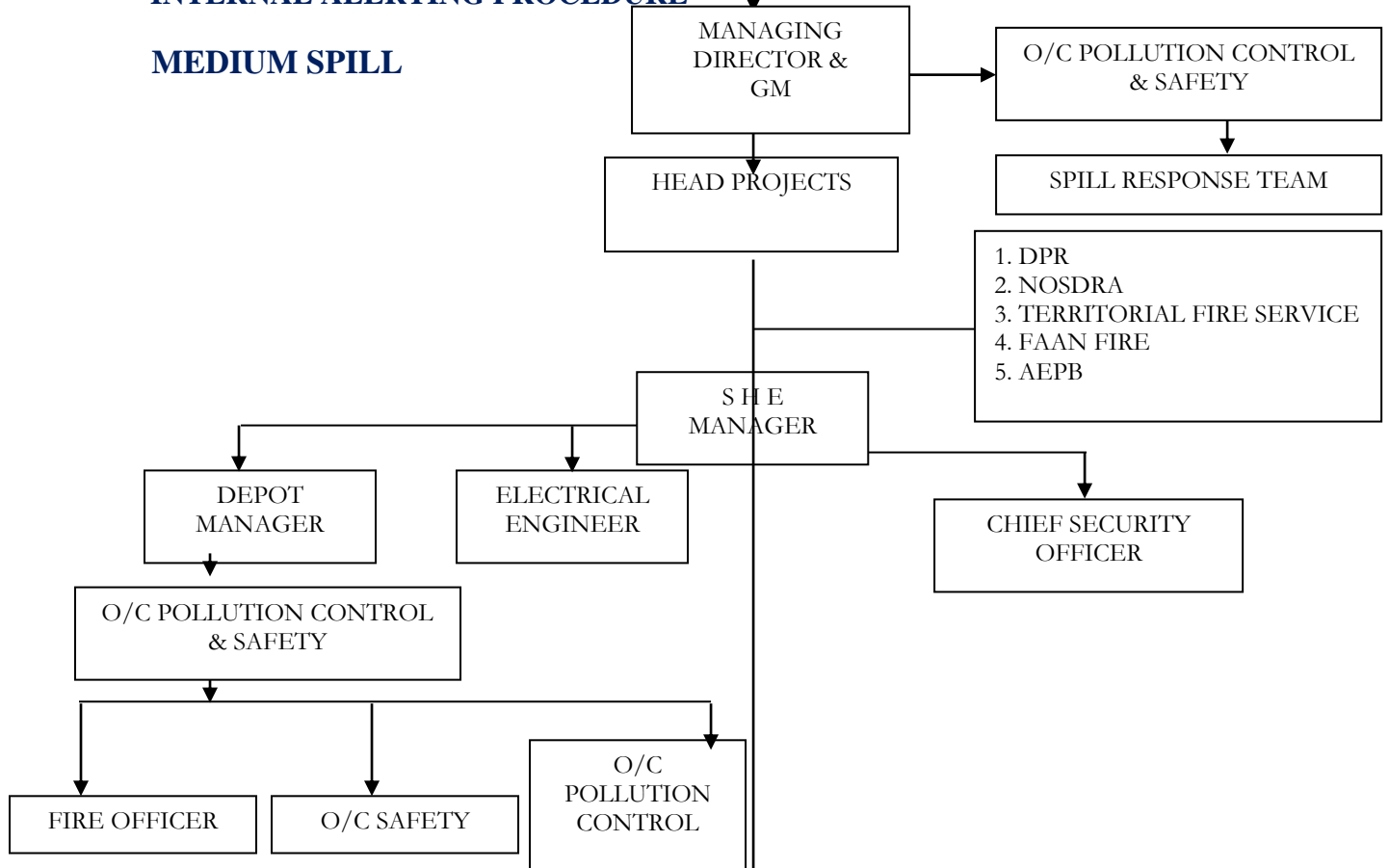


**INTERNAL ALERTING PROCEDURE  
MINOR SPILL**

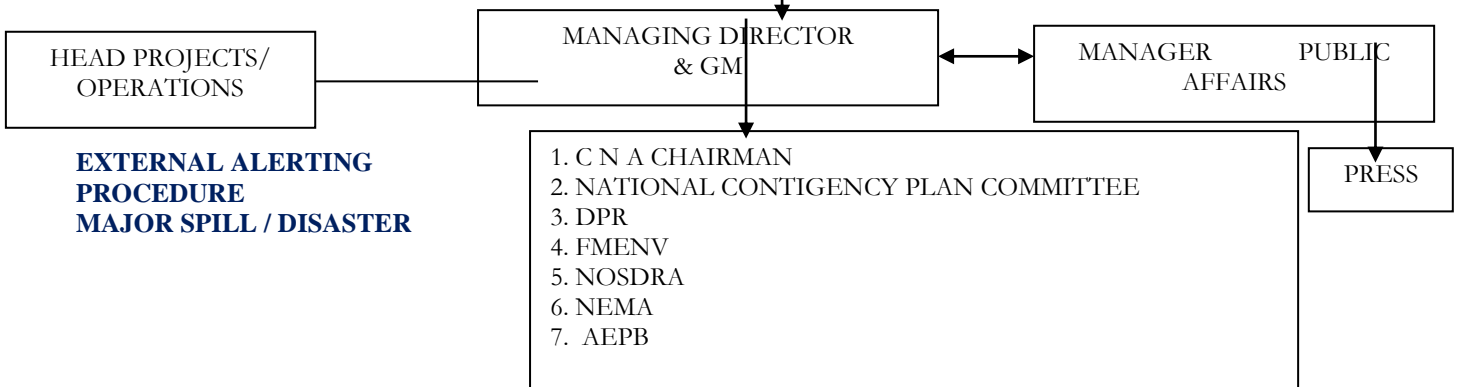


**INTERNAL ALERTING PROCEDURE**

**MEDIUM SPILL**

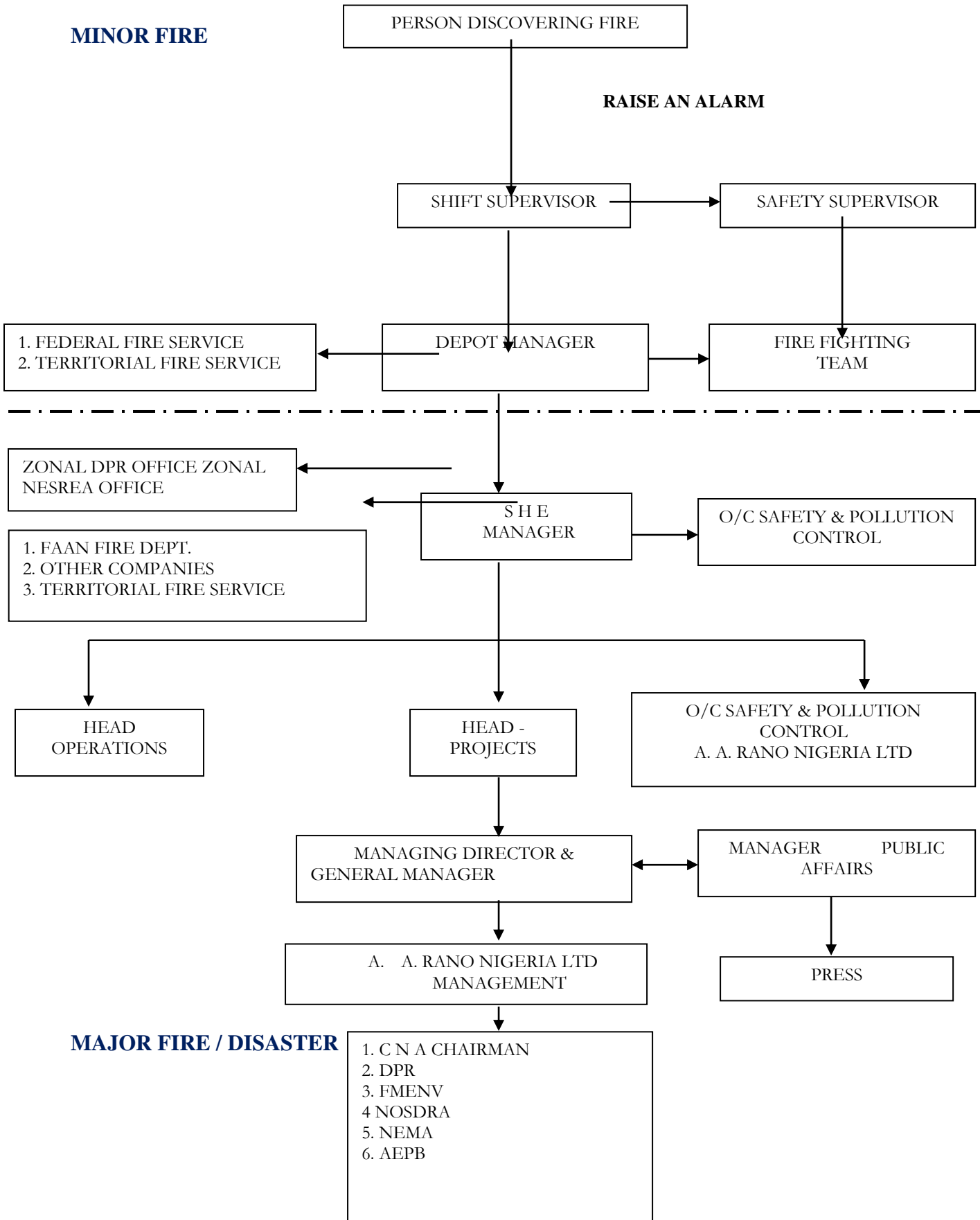


**EXTERNAL ALERTING PROCEDURE  
MAJOR SPILL / DISASTER**



**FIGURE 7.2A: FLOWCHART FOR INTERNAL/EXTERNAL ALERTING PROCEDURE FOR OIL SPILL**

**MINOR FIRE**



**FIGURE 7.2B: FLOWCHART FOR INTERNAL/EXTERNAL ALERTING PROCEDURE FOR FIRE**

**Monitoring Programmes:** A. A. Rano Nigeria Limited shall comply with Federal Ministry of Environment (FMEnv) and Department Petroleum Resources (DPR) regulatory requirements by establishing an environmental monitoring programme for the implementation and operation of the tank farm project. As indicated in Table 7.3, environmental components to be monitored shall include:

1. Air quality;
2. Soil quality for buried pipelines ;

**Drain discharge:** Drainage discharges will occur from a number of sources, which include:

- i. Storm water from rainfall;
- ii. Bunded areas around Petroleum Product tanks or chemical storage areas;
- iii. Overflow drains from the product tank systems.

The oily waste water and chemicals shall be routed to the oily water drainage into the (API separators) treatment system.

Table 7.3: Proposed Environmental Management Plan for the Proposed A. A. Rano Nigeria Limited's ATK Depot Facility Project

Project Activities	Monitoring Frequency	Responsibility /Activity Party	Mitigation Measures	Residual Impact Rating	Parameters for Monitoring	Monitoring Frequency	Responsibility /Activity Party
<b>Site Preparation</b>	<b>a. Air Quality and Noise:</b>  i. Air Pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from equipment, etc.  ii. Noise from equipment will be intermittent, but will increase the background noise level.	<b>Low</b>	. i. All equipment used will be in excellent operating conditions and workers will be equipped with appropriate protective gears.  ii. All equipment will be fitted with necessary antipollution components;  iii. A. A. Rano Nigeria Limited will adopt “switch off engine policy” for any equipment/machine not in use;  iv. Use of appropriate PPEs such as Ear Muffs and Nose Masks shall be enforced at all times, where required.	<b>Low</b>	Monitor the SO <sub>2</sub> , CO, SPM, CH <sub>4</sub> , and Noise level around the location	Every other day during the activity	SHE of A. A. Rano Nigeria Limited
<b>Activities Involved:</b> - Sand Filling the site; - Soil Conditioning and Stabilization; - Geotechnical Surveys for Tank Farm construction Installation Suitability; - Interior Route Preparation, Excavation, Debris Disposal, etc.	<b>b. Water Quality and Hydrobiology:</b>  i. Accidental oil spill during fuelling of equipment that may affect ground water.	<b>Low</b>	i. All necessary measures shall be undertaken to prevent spillage, should it however occur, the affected areas will be cordoned off while necessary mop up operations shall be undertaken;	<b>Low</b>	i. Temperature, colour, turbidity, Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily	Daily during the activity  Weekly	SHE of A. A. Rano Nigeria Limited

					sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD <sub>5</sub> ), pH, Conductivity, and Iron (Fe)	during the activity	
	<b>c. Transportation</b> i. The Heavy equipment movement during mobilization to site may affect traffic in the study area	<b>Low</b>	i. Movement of equipment to site shall be done during off peak hours;	<b>Low</b>	Monitor compliance with plan/mitigation measures	Daily during the activity	SHE of A. A. Rano Nigeria Limited with feedback from community representatives
	<b>d. Accidental</b>	<b>Moderate</b>	i. A. A. Rano Nigeria Limited will adhere strictly to safety precautions.	<b>Low</b>	Check for		SHE of A. A.

	<b>Occurrences and Health:</b> i. Workplace accidental incidences;		iv. Emergency Response Action Plan is being put in place by A. A. Rano Nigeria Limited		compliance with safety procedures at work	Daily during the activity	Rano Nigeria Limited with feedback from community representatives
<b>Construction</b>	<b>a. Air Quality:</b> i. Air pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from construction equipment, vehicles, etc.	<b>Low</b>	a. i. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears. ii. During dry periods, vehicles moving to and from the site will be restricted to operate at speed of less than 10 km/hour; iii. Water shall be sprayed on loose open soil around the construction area during dry season.	<b>Low</b>	Monitor the SO <sub>2</sub> , CO, SPM, CH <sub>4</sub> , and Noise level around the location	Weekly during the activity	SHE of A. A. Rano Nigeria Limited
	<b>b. Health and Safety:</b> i. Work place accidental incidents during loading and off loading of materials / equipment.	<b>Low</b>	b. i. A. A. Rano Nigeria Limited shall adhere strictly to safety precautions.	<b>Low</b>	Monitor compliance with plan/mitigation measures	Every other day during the activity	SHE of A. A. Rano Nigeria Limited

<b>Activities Involved:</b> - Mobilization of men and equipment to site; - Foundations (Tanks, Buildings, Pump Sheds, Bund walls, Separators, Loading Bay, etc.); - Erection of Office Building, MMC & Control Room; - Construction of Loading Bay; - Construction of Interior Route and Trucks Park; - Fabrication of Product Tanks, Firewater Tank, Slop Tanks, Foam Tanks & other Fire Fighting Systems; - Construction of Oil/Water Separator and Drains; - Sinking Monitoring Wells; - Construction of Water and Wastewater Treatment Plants; - Procurement & installation of the various Pumps; - Piping Fabrication as per MFD's and line list; - Procurement and Installation of Cablings, switches and controls to all electrical drives and lights;	b. (ii). Loud noise at project site leading to hearing problem.	Low	b. ii. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears;  iii. Wherever feasible, equipment shall be fitted with silencers and acoustic mufflers.	Low	Monitor Noise Levels around the key points of impact	Every other day during the activity	SHE of A. A. Rano Nigeria Limited
	<b>c. Transportation:</b> c. (i). Movement of construction equipment and vehicular movement that could increase the traffic situation on Airport Road	Low	Movement of equipment to site shall be timed to ensure that it does not interfere with normal traffic.  Movement to be done very early in the morning or late at night	Low	Monitor vehicular (trucks and oil tankers) movement around the area	Every day during the activity	SHE of A. A. Rano Nigeria Limited
	<b>d. Spillage / leakage /fumes</b>	Low	i. All necessary measures shall be undertaken to prevent spillage, should it however occur, the affected areas will be cordoned off while necessary mop up operations shall be undertaken	Low	Monitor compliance with plan/mitigation measures	Every Other day during the Activity	SHE of A. A. Rano Nigeria Limited
	<b>e. Fire/Explosion</b>	Moderate	f. i. A. A. Rano Nigeria Limited shall adhere strictly to safety precautions;  ii. A. A. Rano Nigeria Limited is	Low	Monitor compliance with plan/mitigation measures	Every other day during the activity	SHE of A. A. Rano Nigeria Limited

<p>- Procurement &amp; Installation of all Instrumentation Equipment;</p> <p>- Procurement &amp; Installation of SCADA System;</p>			<p>already putting in place an Emergency Response Plan and shall be religiously adhered to by the Company;</p> <p>iii. A. A. Rano Nigeria Limited has a standing arrangement with Federal / Territorial Fire Services for additional help in preparedness for eventualities as part of the emergency provisions.</p>			
	<p><b>f. Waste Management:</b> Wastes to be generated will include:</p> <ul style="list-style-type: none"> <li>i. Metal cuttings;</li> <li>ii. Packaging materials</li> <li>iii. Hazardous wastes such as anti-corrosion chemicals and paints;</li> <li>iv. Empty drums and tins;</li> <li>v. Welding electrode butts;</li> <li>vi. Toileting Activities.</li> </ul>	<p><b>Low</b></p>	<p>g. i. The affected areas will be barricaded so as to control the movement of materials in addition to appropriate measures for shoreline protection;</p> <p>ii. Materials shall be sorted for ease of reuse, and possible recycling prior to environmental safe disposal of others.</p>	<p><b>Low</b></p>		



Operation	<p><b>a. Air Quality and Noise:</b>                  Impact from:                  i. Fugitive emissions from stored petroleum product;                  ii. Combustion exhausts from products pumps, power generators, and road tanker trucks, thereby reducing the quality of air in the area.                  iii. Noise from various equipment will be intermittent, but will increase the background noise level.</p>	Low	<p>a. i. All flanges and vents shall be properly tightened to minimize fugitive emissions.                  ii. All systems shall be regularly checked to ensure that there are no leakages and losses.                  iii. All machinery, equipment and vehicles to be used for the project shall have high efficiency rating to reduce impact on air quality and noise.                  iv. Mufflers / silencers shall be put in the exhaust pipes to reduce noise.                  v. Tanks cooling with water and proper aeration shall be undertaken regularly.                  vi. Should there be any incidence that could affect the source of drinking water, alternative source of drinking water shall be provided for the local/affected communities; this could include the sinking of borehole and provision of water treatment plant.</p>	Low	<p>i. Check for compliance with safety procedures at work;                  ii. Check for leaks, Generators and other electrical facilities, fumes of petroleum products-                  iii. Monitor the SO<sub>2</sub>, CO, SPM, HC, CH<sub>4</sub>, and Noise level around the location</p>	<p>Every other day during the activity</p> <p>Weekly</p> <p>Daily</p>	<p>SHE of A A. A. Rano Nigeria Limited</p> <p>“</p> <p>“</p>
	<p><b>b. Water Quality</b></p>	Low	<p>b. i. A. A. Rano Nigeria Limited shall</p>	Low	<p>i. . Temperature,</p>	<p>Monthly.</p>	<p>Fed. Min. of</p>

	<p><b>and Hydrobiology:</b></p> <p>i. Accidental oil spill during loading and off-loading of products.</p>		<p>adhere strictly to best practice in ensuring that oil spillage is avoided.</p> <p>ii. All water flows around the premises of the depot shall be channelled into the Oil-Water Separator being designed along with this project;</p> <p>iii. Should there be any incidence that could affect the source of drinking water, alternative source of drinking water shall be provided for the local/affected communities;</p>		<p>colour, turbidity, Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD<sub>5</sub>), pH, Conductivity, and Iron (Fe); of the wastewater being</p> <p>Weekly</p>	<p>Envir.; DPR; Abuja Environmental Protection Board and SHE of A. A. Rano Nigeria Limited</p> <p>“</p>
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					discharged		
<p><b>Activities Involved:</b></p> <ul style="list-style-type: none"> <li>- Receiving ATK from Tank Trucks;</li> <li>- Storing the ATK;</li> <li>- Loading and delivering the above stated product to refuellers towards fuelling of aircrafts;</li> </ul>	<p><b>c. Transportation:</b></p> <ul style="list-style-type: none"> <li>i. Heavy vehicular movement (tankers and trucks) along the Road (more than 20 trucks per day)</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>c. i. A Trucks Withholding Bay to hold about thirty (30) trucks within the proposed depot is planned along with the proposed project</li> <li>ii. In addition, there is plan to collaborate with other investors in the area</li> </ul>	<b>Low</b>	<p>Monitor compliance with plan/mitigation measures</p>	<p>Weekly during the activity</p>	<p>SHE of A. A. Rano Nigeria Limited and Community Representatives</p>
	<p><b>e. Accidental Occurrences:</b></p> <ul style="list-style-type: none"> <li>i. Rupture of product Tanks / pipelines;</li> <li>iii. Fire and Explosions at the Tank Farm;</li> <li>iv. Work place accidental incidence.</li> </ul>	<b>Moderate</b>	<ul style="list-style-type: none"> <li>i. Adequate oil spill response equipment shall be provided within the Tank Farm premises;</li> <li>ii. Bund walls shall be built round each product tank in case of product tank rupture;</li> <li>iii. A firewater tank of over 301m<sup>3</sup> and a tank foam pouring system shall be provided on site to automatically be deployed in case there is a fire incident.</li> <li>iv. A. A. Rano Nigeria Limited has a standing arrangement with Federal / Territorial Fire Services for additional help in preparedness for eventualities as part of the emergency provisions.</li> <li>v. Emergency Response Action Plan is</li> </ul>	<b>Low</b>	<ul style="list-style-type: none"> <li>i. Check for compliance with safety procedures at work;</li> <li>Monitor the SO<sub>2</sub>, CO, SPM, HC, CH<sub>4</sub>, and Noise level around the location</li> </ul>	<p>Weekly</p> <p>Daily</p>	<p>SHE of A. A. Rano Nigeria Limited</p> <p>“</p>

			<p>already being put in place and shall be religiously adhered to by A. A. Rano Nigeria Limited;</p> <p>vi. All refuellers coming to load at the depot shall be mandated to compulsorily have Spark Arrestors installed</p> <p>vii. Lightning Arrestors shall be installed on the Product Tanks and other structures within the proposed depot for prevention purposes.</p>				
<p><b>f. Waste Management:</b> Wastes to be generated will include:</p>							
	<p><b>f (1) Solid Wastes Generation:</b></p> <p>i. Damaged seals</p> <p>ii. Oil-stained rags, sand and wood shavings / sawdust</p> <p>iii. Papers from the offices</p> <p>(iv. Sweepings from the compound</p>	<p><b>Moderate</b></p>	<p>i. Segregation of wastes according to types, into dedicated / colour coded bins shall be undertaken</p> <p>ii. A secure solid wastes dump to store the waste bins shall be implemented</p> <p>iii. Disposal of solid wastes shall be done through Government Accredited Contractors</p>	<p><b>Low</b></p>	<p>Check for leaks from equipment and storage facilities; and compliance with best practice procedures</p>	<p>Every other day during the activity</p>	<p>HSE of A. A. Rano Nigeria Limited</p>
	<p><b>f (2) Liquid Wastes Generation:</b></p> <p>i. Floors washing</p>	<p><b>Moderate</b></p>	<p>i. All run-off and floor washing water shall be channelled into the Oil-Water</p>	<p><b>Low</b></p>	<p>i. Temperature, colour,</p>	<p>Monthly.</p>	<p>Fed. Min. of</p>

	(ii. Run-off		<p>Separator (OWS) for treatment before eventual discharge</p> <p>ii. Monitoring shall be implemented</p> <p>iii. The OWS discharges shall be ensured to conform to set limits</p>		<p>turbidity, Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD<sub>5</sub>), pH, Conductivity, and Iron (Fe); of the wastewater being discharged and Creek.</p>		<p>Envir.; DPR; Abuja Environmental Protection Board (AEPB) and HSE of A. A. Rano Nigeria Limited</p>
	<p><b>f (3) Oil Wastes Generation:</b></p> <p>i. As spillage/leakage during products reception and pump house activities</p> <p>ii. As spillage/leakage from diesel tanks and</p>	<b>Moderate</b>	<p>i. Adequate efforts shall always be made to avoid the spillage of oil around the premises</p> <p>ii. The waste oil that may result from periodic servicing of electricity generators</p>	<b>Low</b>	<p>i. Check for leaks from equipment and storage facilities; and compliance with best practice procedures</p>	<p>Every other day during the activity</p>	<p>HSE of A. A. Rano Nigeria Limited</p> <p>Fed. Min. of</p>

	<p>generator houses</p> <p>iii. As spillage/leakage from filling machines and also pallet trucks</p> <p>(iv. As spillage during collection and containerization of used oils and solvents/storage</p>		<p>shall be stored in drums prior to disposal</p> <p>iii. All drains and runoffs shall be channelled into the Oil-Water Separator (OWS) to prevent oil laden water flowing into the lagoon</p> <p>iv. Spill Prevention Countermeasure and Control (SPCC) Plan is already been put in place</p> <p>v. The SPCC Plan shall be strictly adhered to</p> <p>vi. The OWS shall be constructed and operated to give the possible discharge.</p>		<p>ii. Temperature, colour, turbidity, Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD<sub>5</sub>), pH, Conductivity, and Iron (Fe); of the wastewater being discharged and Creek.</p>	<p>Monthly</p>	<p>Envir.; DPR; Abuja Environmental Protection Board (AEPB) and HSE of A. A. Rano Nigeria Limited</p>
<p><b>DECOMMISSIONING &amp; ABANDONMENT</b></p>	<p><b>a. Wastes:</b> scrap materials arising from decommissioned</p>	<p><b>Moderate</b></p>	<p>a. i. Scrap materials from the installations shall be thoroughly cleaned, detoxified and treated by</p>	<p><b>Low</b></p>	<p>i. Temperature, colour, turbidity,</p>	<p>Quarterly</p>	<p>Fed. Min. of Envir.; DPR; Abuja</p>

	buildings/tanks / pipelines;		professionally equipped contractors before scraping; ii. Wastes / scrap materials shall be sold; those that could not be sold shall be contracted out to Government Licensed waste disposal outfits for proper disposal. iii. A. A. Rano Nigeria Limited shall Restore the land to its original form.		Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD <sub>5</sub> ), pH, Conductivity, and Iron (Fe) of the wastewater being discharged	Weekly	Environmental Protection Board (AEPB) and SHE of A. A. Rano Nigeria Limited SHE of A. A. Rano Nigeria Limited
	b. Workplace		<b>Moderate</b>		b. A. A. Rano Nigeria Limited shall	<b>Low</b>	Check: Pipes

	accidents / incidents.		adhere strictly to safety precautions.		for leakages, generators and other electrical facilities, fumes of petroleum products- Monitor Traffic Flow and Parking Lots to ensure compliance with plans		Rano Nigeria Limited
	<b>c. Air Quality:</b> Air pollution as a result of SO <sub>2</sub> , CO, SPM, etc., into the atmosphere from demolition equipment, vehicles, etc.	<b>Moderate</b>	c. i. All construction equipment shall be well maintained and workers shall be equipped with appropriate protective gears. ii. Being a commercial/high activity area, demolition exercise will be undertaken during the working hours when the noise level differential will be relatively insignificant; iii. To reduce the Suspended Particulate Matter (SPM) concentration, the site and access road	<b>Low</b>		When receiving and loading products  Weekly	DPR and SHE of A. A. Rano Nigeria Limited  SHE of A. A. Rano Nigeria



			will be watered intermittently during the carting away of the rubbles from demolition;				Limited
	<b>d. Water Resources:</b> Accidental discharge of oil and solid	<b>Moderate</b>	<p>d. i. The affected areas will be barricaded so as to control the movement of materials;</p> <p>ii. A. A. Rano Nigeria Limited shall adhere strictly to best practice in ensuring that oil spillage is avoided.</p> <p>iii. All water flows around the premises of the proposed depot shall be channelled into the Oil-Water Separators planned along with the proposed project;</p> <p>iv. A. A. Rano Nigeria Limited shall Restore the land to its original form</p>	<b>Low</b>	<p>i. Monitor compliance with plan/mitigation measures;</p> <p>ii. Temperature, colour, turbidity, Dissolved Oxygen (DO), Total Hydrocarbon Content; Oily sheen, Organic Matter, Total Suspended Solids, Total Coliform, Chemical Oxygen Demand (COD), Biochemical</p>	Weekly during the activity	SHE of A. A. Rano Nigeria Limited

					Oxygen Demand (BOD <sub>5</sub> ), pH, Conductivity, and Iron (Fe)		
	e. <b>Transportation:</b> Interference with other road users due to traffic of moving crew, equipment, rubbles and scraps.	<b>Moderate</b>	e. Movement of equipment to site shall be timed to ensure that it does not interfere with normal traffic. Movement to be done very early in the morning or late at night. f. A. A. Rano Nigeria Limited shall adhere strictly to safety precautions.	<b>Low</b>	Check for compliance with safety procedures at work	Every other day during the activity	SHE of A. A. Rano Nigeria Limited
		<b>Moderate</b>		<b>Low</b>			
	<b>Activities Involved:</b>	<b>Moderate</b>		<b>Low</b>			
	- Staffs Disengagement; - Controlled Demolition of Existing Structures; - Clearing, Sorting/Separation of removed Materials; - Storage, Sale, or Disposal of removed Materials.	<b>Low</b>		<b>Low</b>			

## CHAPTER EIGHT

### 8.0 DECOMMISSIONING AND ABANDONMENT PLAN

#### 8.1 Introduction

8.1.1 Every project is usually designed with an expected life span and so, no matter how long the design life, all projects eventually close out. The life span may sometimes be less than planned, while in some cases, it can be extended with proper planning and maintenance. The longevity of any development project is primarily dependent on a number of factors, these include:

1. Availability of Products;
2. Durability of Equipment and Machinery;
3. Profitability of the Project;
4. Usefulness and Acceptability of Product;
5. Sustainability of the facility and manpower.

This project is planned to last for at least 25 years. This estimate is based on the following premises:

- i. Nigeria has more than 30 years of crude oil reserve and so, even if importation of refined product is discontinued, the tank farm will still find veritable use for storage of locally refined products;
- ii. Petroleum products are premium industrial fuels and even if alternatives come up in the near future, they are not likely to be completely phased out of use within the next 20 - 30 years and as such, the tank farm will continue to be a veritable source of products for the local market.

However, if and when the Company decides not to use the facility for products storage anymore, either because products are no longer readily available, or because the economics are no longer favourable A. A. Rano Nigeria Limited will decommission the entire system. While this is not expected to occur within the next twenty to thirty years, it is, all the same, necessary to start planning, at this stage, for the closure stage, when the use of the facility have to be discontinued. For this reason therefore, this chapter of the report discusses succinct plan for the decommissioning of the petroleum tank farm system.

## 8.2 Site Remediation Plan after Decommissioning

The proposed project, as conceived is not expected to have any significant long-term negative effects on the environment, especially after decommissioning. A number of safety measures and devices have been built into the project, such that it will operate at minimum risk. However, the following measures need to be planned for implementation after decommissioning:

1. The tanks shall be dismantled and sold at scrap value;
2. Bund walls around the tank bases shall be demolished and the opened up area re-vegetated; the broken blocks shall be sold for use as hardcore while the reinforcement bars shall be sold to second-hand rods and scraps dealers;
3. Contaminated soils, where they occur, shall be restored, using various options such as thermal, chemical and/or biological remediation;
4. All pits and excavation shall be reclaimed and re-vegetated;
5. Buildings used for administrative purposes shall be leased out or used for other productive ventures;
6. Appropriate pension schemes shall be put in place for project workers so that they can have something to fall back on if and when the project is decommissioned;

It is expected that if these measures are implemented, an excellent site restoration after decommissioning can be achieved.

## CHAPTER NINE

### 9.0 CONCLUSION

9.1 Given the detailed description of baseline environmental characteristics of the project area, and the exhaustive impact identification that have been presented in earlier sections of this report, we can make the following conclusions.

1. The need to diversify the downstream activities in the petroleum sector of the economy as promoted by successive Nigerian Governments, clearly supports the desirability of this project;
2. The presence of the proposed project in Federal Capital Territory, Abuja, will not only serve to improve the availability of ATK for aircrafts coming in and out of Federal Capital Territory, Abuja, but will also affect, by extension, the immediate environs of Aviation Village;
3. The associated and potential negative impacts of the project, as identified in Chapter Five of this report, are far outweighed by the anticipated positive impacts that could attend the project.
4. Given the foregoing therefore, it is our expectation that if appropriate mitigation measures, particularly those recommended in Chapter Six of this report are implemented, and if the monitoring and management programme (as presented in Chapter Seven) for the environment are equally handled in proper perspectives, the entire project can be implemented in a sustainable manner.

9.2 Based on the above submissions, we are praying the Department (DPR) to, please, grant us EIA Permit on our proposed Aviation Turbine Kerosene (ATK) Depot at Aviation Village, Nnamdi Azikiwe International Airport Road (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Federal Capital Territory, Abuja, Nigeria, using this EIA on the project as basis of assessment.

## REFERENCES

- Adegbehin, J. O. and Nwaigbo, L. C. (1990). Mangrove Resources in Nigeria: Uses and Management Perspectives. *Nature and Resources*, Vol. 26, n 2, 13 – 20;
- (Advance Copy) UNITED NATIONS, Economic and Social Council; Draft Elements for a Protocol on Strategic Environmental Assessment, 8 March 2001;
- Ajao, E. A. (1990): A Study of the Sediments and Communities in Lagos Lagoon, Nigeria, *Oil and Chemical Pollution*. 7, 85-117;
- Ajao, E. A. (1991). Environmental Problems in Coastal Fish Production in Nigeria. In : Proceedings of the 4<sup>th</sup> Annual Seminar of CODRI, ed. J. G. Tobor and B.I.O. Ezenwa. NIOMR 125 – 131;
- Ajao, E. O. (1993): Mangrove Ecosystem in Nigeria : In Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11- pp155 – 167;
- Ann L. Riley, *Restoring Streams in Cities - A Guide to Policy Makers, and Citizens*; Island Press, Washington DC
- Ayeni, J.S.O., Afolayan, T.A. and Ajayi, S.S.(1983). *Introductory Handbook on Nigerian Wildlife*. Saclog Production, Ilorin Nigeria, 80pp;
- Borky S. G. Bakre & Associates (2001). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Beachland Estate, Apapa by Obat Oil & Petroleum Limited;
- Borky S. G. Bakre & Associates (1999). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Kayode Street, Apapa by Agip/Elf Joint Venture;
- Borky S. G. Bakre & Associates (2009). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at 25, Creek Road Apapa, by Cottoil Limited;
- John G. Rau David C. Wooten, *Environmental Impact Analysis Handbook*; McGRAW-HILL BOOK COMPANY;
- Canadian International Development Agency; *Environmental Assessment – About Environmental Assessment*, September 4, 2004;
- Carmelo, R. T. (1997): *Identifying Marine Phytoplankton*. Academic Press, London. 858p;
- Chapman, J. R. (1965). Keys to Nigerian species of “Rhizophora” (from Fed. Forestry Research);
- Chapman, V. J. (1970). Mangrove Phytosociology. *Trop. Ecol.*, 11. pp. 1 – 19;

- Charter, J. R. (1971). Nigeria, s wild life: a forgotten asset. IUCN Publ. New series, Morges, Switzerland;
- Charter, J. R. (1970). The economic value of wildlife in Nigeria. First Annual Conference of Forestry Association of Nigeria. Univ. of Ibadan;
- Davis, A. Richards Jr. (1975): Principles of Oceanography: PLANKTON Chapter 16. Cambridge Univ. Press, pp 226 –276;
- Department of Petroleum Resources (2002). Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGAPSIN);
- Diops, E. S. (1993): Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11;
- Dodge, J. D. (1985): Atlas of Dinoflagellates: A Scanning Electron Microscope Study. Ferrand Press, London. 119p;
- Dodge, J. D. (1973): Marine Dinoflagellates of the British Isles. Her Majesty Stationery Office, London. 303p;
- Dublin-Green, C. O. and Ojanuga, A. G. (1988). The Problem of Acid Sulphate Soils in Brackish Water Aquaculture. A preliminary Study of Soils of NIOMR/ARAC Fish Farm, Buguma, River State, Nigeria, NIOMR Tech. paper No. 45; 20pp
- European Commission Guidance on EIA/EIS Review (European Commission, 2001);
- FAO/UNEP. (1981). Tropical Forest Resources Assessment Project. Forest Resources of Tropical Africa. Part II country brief. FAO, Rome;
- FEPA (1991). National Environnemental Protection (Effluent Limitation) Régulations. Federal Environmental Protection Agency, Nigeria;
- FEPA (1992). Environmental Impact Assessment (Decree No. 86, 1992) - Procedural Guideline. Federal Environmental Protection Agency, Nigeria;
- FEPA (1995). Environmental Impact Assessment Sectoral Guidelines: Oil and Gas Industry Projects. Federal Environmental Protection Agency, Nigeria;
- Fischer, W., Bianchi, G and Scott, W.B. (1981). FAO Species Identification Sheets for Fishery Purposes for the East Central Atlantic, Fishing area 34, 47 (in part). Vol. 1 – 1V;
- Fraser, J. H. (1965): Zooplankton Indicator Species in the North Sea. In Serial Atlas of the Marine Environment, Folio 8 American Geographical Society. 219p;

- Gibbons, J. Mark (2003): An Introduction to the Zooplankton of the Benguela Current Region. 51p;
- Government of Newfoundland & Labrador, Department of Environment; Policy Directive:  
Environmental Assessment Procedure, December 10, 1986;
- Hallegraeff, G. M., Anderson, D. M. and Cembella, A. D. (Eds). (1995): Manual on Harmful Marine Micro-Algae. UNESCO Press, France. 551p;
- Hardy, A. C. (1956): The Open Sea, Its Natural History: The World of Plankton. London, Collins. 335p;
- Hoek, C. V. D., Mann, D. G. and Jahns, H. M. (1995): ALGAE: An Introduction to Phycology. Cambridge University Press. 622p;
- Inter-American Development Bank – IDB Training Program: Trainers' Course on Environmental Management and Assessment for Investment Projects (2002);
- IOC-DANIDA UNESCO (1999): A Compilation of Harmful Micro-Algae of the World in Photograph: IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Algae. UNESCO PUB. 86p;
- Isebor, C. E. and Awosika, L. F. (1993): Nigerian Mangrove Resources: Status and Management: In Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11 pp 169 – 185;
- Ita, E. O. (1994). Aquatic Plants and Wetland Wildlife Resources of Nigeria. CIFA Occasional Paper No. 21, FAO Pub. CIFA/OP 21. pp.52;
- John Zetter, Planning Directorate, Department of the Environment, United Kingdom; Policies for Creating Environmentally Sound Industries, September 1996;
- Keay, R.W. J. (1958): Marine Bottom Communities, Biol. Rev. 25: 283-313;
- Kio, P.R.O. (1983). Management Potentials of the Tropical High Forest with Special Reference to Nigeria. In: Tropical Rainforest: Ecology and Management. Sutton, Whitmore and Chadwick;
- Lagos State Education Management System/Min. of Education;
- Lagos State Environmental Protection Agency Edict (Edict No. 9, 1996);
- Lagos State Regional Plan (1980-2000), published by Ministry of Economic Planning and Land Matters, Urban and Regional Planning Division, Lagos State Secretariat;
- Lawson, G.W. (1986) Coastal Vegetation, Chapter 8 pp.195-213, in: G.W. Lawson (ed) Plant ecology in West Africa. John Wiley, Chichester, 357p;



- Longhurst, A. R. (1965): The Coastal Oceanography of the Gulf of Guinea. Bull. IFAN XXVI (A) no. 2;
- Longhurst, A. R. (1958): The Ecological Survey of the West African Marine Benthos. Colonial Office Fisheries Publication. No. 11, 102pp;
- Moses, B. S. (1985). Mangrove Swamps as a Potential Food Sources in Balafauna;
- Newell, G. E. and R. C. Newell (1977): Marine Plankton: A Practical Guide. Hutchinson, London. 244p;
- Nigerian Meteorological Agency (NIMET), Oshodi, Lagos (2007);
- Nwankwo, D. I. (2004): THE MICRO ALGAE: Our Indispensable Allies in Aquatic Monitoring and Biodiversity Sustainability. Inaugural Lecture Series. University of Lagos Press. 44p;
- Office for Official Publications of the European Communities' Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (May 1999);
- Okigbo, L. C. (1984). Potentials for Mangrove Utilization in Nigeria. Skoup and C, Enugu. 14<sup>th</sup> Annual Conference of the Forestry Association of Nigeria, pp. 127 – 140. Univ. of Ibadan;
- Olaniyan, C. I. O. (1968): An Introduction to West African Animal Ecology, Heinemann Educational Books, Ltd London. 167pp;
- Omori, M. and T. Ikeda (1984): Methods in Marine Zooplankton Ecology. John Wiley & Sons Inc. 311p;
- Owre, H. B. and Foyo, M. (1964): FAUNA CARIBAEA: NUMBER 1: CRUSTACEA, PART 1: COPEPODA: Copepods of the Florida Current, with illustrated Keys to Genera and Species. Institute of Marine Science, Univ. of Miami Press. 136p;
- Oyebanji, M.O., Kusemiju, K., and Nwankwo, D. I. (1999): A Survey of the Plankton and the Physico-chemical Parameters of Lagos Lagoon. Gulf of Guinea Large Marine Ecosystem Project Publication;
- Oyebanji, M. O., Ikusemiju, K. and Nwankwo, D. I. (1996): The Physico-chemical Fluctuation and Plankton Distribution and Abundance of the Lagos Lagoon in Lagos. Study submitted to GCLME Project of UNIDO;
- Raymont, J. E. R. (1963): Pure and Applied Biology, International Series of Monographs: Plankton and Productivity in the Oceans. Pergamon Press, London. 660p;
- Richards, P. W. (1939). Ecological Studies on the Rain Forest of Southern Nigeria. In: The Structure and Floristic Composition of the Primary Forest. Journal of Ecology **27**: 1-61;

Rosevear, D. R. (1954). Vegetation and Forestry. In: The Nigeria Handbook. Lagos, Nigeria: The Government Printer;

Schiotz, A. (1963). Amphibians of Nigeria. Vidensk Medd. GRA. *Dansk. Naturh Foren*, 125; 1 – 92;

The World Bank Environmental Assessment Sourcebook (Vol. 1 and 3);

Todd, C. D. and M. S. Laverack (1991): Coastal Marine Zooplankton: A Practical Manual for Students. Cambridge Univ. Press pub. 65p;

Triple "E" Systems Associates Limited (2004). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Creek Road, Apapa by Folawiyo and Sons Limited;

Wiaffe, G and Chris, L. J. F. (2001): Marine Zooplankton of West Africa: A Darwin Initiative Report 5, Ref. 162/7/451.; University of Ghana and University of Newcastle Joint pub. 120p;

Wilcox, H. P. and Powell, C. B. (Eds.). Proceedings of a Workshop on Mangrove Ecosystem of the Niger Delta, pp. 177 – 184. Univ. of Port Harcourt, Nigeria;

Wolfgang, S. (1990). Field Guide to the Commercial Marine Resources of the Gulf of Guinea. FAO Document. RFR/90/2. pp.288;

World Bank Report on Household Survey, 2006;

[www.nigeriacongress.org](http://www.nigeriacongress.org);

[www.nigerianmuse.com](http://www.nigerianmuse.com);

2007 Cimate-charts.com;

2004 Oxford Cartographers;

2007 Wikipedia.org;

Borky S. G. Bakre & Associates (2011). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by First Deepwater Discovery Limited;

United Nations Environment Programme UNEP (Division of Technology, Industry and Economics and Trade Branch). Environmental Impact Assessment Training Resource Manual (Second Edition 2002);

Environmental Integration Handbook for European Commission Development Co-operation (2006);

Borky S. G. Bakre & Associates (2015). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by A. A. Rano Nigeria Limited;

Borky S. G. Bakre & Associates (2015). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by MAO Petroleum Company Limited;

Jenkona Nig. Ltd (2015). Preliminary Impact Assessment Report of Jushad Oil and Gas Limited Proposed Aviation Depot at Murtala Mohammed Airport;

Everlink Telesat Network Limited (2019) EMP of the Proposed Four Star Hotel Project, also along Nnamdi Azikiwe International Airport, Aviation Village, Abuja Municipal Area Council (AMAC), Federal Capital Territory, Abuja, Nigeria;

[www.researchgate.org](http://www.researchgate.org)

# **APPENDIX A**

**Terms of Reference / Scope of Work for the EIA Proposed A. A. Rano  
ATK Depot, Aviation Village, Abuja**

----- Pages 1-43

# **Terms of Reference (TOR)/Scope of Work**

*for*

**ENVIRONMENTAL IMPACT ASSESSMENT (EIA)**

**of the**

**PROPOSED AVIATION TURBINE  
KEROSENE (ATK) DEPOT**

**at**

**AVIATION VILLAGE, ALONG  
INTERNATIONAL AIRPORT ROAD,  
ABUJA MUNICIPAL AREA COUNCIL (AMAC)  
ABUJA, FCT**

*Submitted to:*

**FEDERAL MINISTRY OF ENVIRONMENT  
ABUJA**

*Submitted by:*

**A. A. RANO NIGERIA LIMITED**

***OCTOBER, 2020***

## SECTION 1

### 1.0 INTRODUCTION

#### 1.1 Background Information

1.1.1 **INDUSTRIAL DEVELOPMENT, BECAUSE OF ITS ECONOMIC AND CONSEQUENT SOCIAL BENEFITS, IS A NATIONAL PRIORITY!** However, industrial development/economic expansion, to engender the desired optimum benefits, ought to be reconciled with the environmental attributes which will one way or the other be affected by such activities since the attributes have bearing on the sustenance and survival of humans (the intended beneficiaries of such actions).

1.1.2 The driving force for industrial and commercial activities and growth in every nation is, however, energy. One of the main/most important sources of energy supply in the world today is Petroleum with its derivatives.

1.1.3 Nigeria is the world's eighth (8) largest exporter of crude oil. However, the availability of the refined product within the country had been a problem for some time, hence the Government regulated the downstream segment of the industry to encourage more interested and serious part get involved in the acquisition, storage and distribution of the refined products to the Nigerian consumers.

1.1.4 **A. A. Rano Nigeria Limited** that has its Head Office at Rano House, Opposite NNPC Depot, Hotoro, Kano, Kano State, is an indigenous Company registered in Nigeria under the Companies and Allied Matters Act 1990 (Re: RC 399320). The Company, established on 5<sup>th</sup> of January 2001, has been a major player in the downstream operations of the Nigerian petroleum industry. It has been engaging in those activities which involve storage, distribution, bulk-breaking; and largely concentrated on the retailing of Premium Motor Spirit (PMS or Petrol), Automotive Gas Oil (AGO or Diesel), Dual Purpose Kerosene (DPK or Kerosene) and Aviation Turbine Kerosene (ATK or Jet Fuel). These products have the highest demand for local consumption for energy.

### 1.2 THE PROJECT

**Project Title:** This Environmental Impact Assessment (EIA) study is on **A. A. Rano Nigeria Limited's Aviation Turbine Kerosene (ATK) Depot**

**Proponents:** The proponents of this project are messrs.: **A. A. Rano Nigeria Limited**, the Company was incorporated in 2001, as a Company to carry on business in the Oil and Gas industry in Nigeria.

The Key Contact Person in respect of this EIA project is Alhaji Mohammed **Sule**, a Director, of **A. A. Rano Nigeria Limited**.

However, for the purpose of **this EIA project the contact phone number is:**  
**0803 814 8906**

### **Nature of the Project**

**A. A. Rano Nigeria Limited** is proposing to build an Aviation Turbine Kerosene (ATK) Depot.

The project will involve:

- Receiving,
- Storage,
- Loading and Distribution / Dispensing, the Aviation Turbine Kerosene (ATK) Depot

These products will come from both local and imported sources.

The designed total storage capacity of the Aviation Turbine Kerosene (ATK) Depot is 3,230.2 Cubic Metres, which will be made up of:

- 1 – Vertical ATK Tank of 2,000 Cubic Metres effective capacity;
- 2 – Vertical ATK Tanks of 502 Cubic Metres effective capacity each, thereby making a total of 1004 Cubic Metres effective capacity;
- 3 – Horizontal ATK Tanks of 75.4 Cubic Metres Effective capacity each, thereby making a total of 226.2 Cubic Metres Effective capacity.

In addition to the above, the facility will have a ,275 Cubic Metres (effective capacity) tank of fresh water for firefighting purposes; and 1 No. Slop Tank of 30 Cubic Metres effective capacity.

**See the Appendices for the relevant drawings/ diagrams**

## **1.3 LOCATION OF PROPOSED TANKFARM**

1.3.1 The Proposed Aviation Turbine Kerosene (ATK) Depot is to be located on a parcel of land with the following geo-coordinates: **8°59'9.208"N to 8°59'19.846"N and 7°16'9.629"E to 7°16'22.542"E**), within Aviation Village, along Nnamdi Azikiwe

International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT, Nigeria.

The site of the proposed facility is bounded by the following:

- 1.) On the Northern Axis by Nnamdi Azikiwe International Airport Road;
- 2.) On the Southern Axis by a vacant plot belonging to A. A. Rano Nigeria Limited;
- 3.) On the Eastern Axis by a vacant plot;
- 4.) On the Western Axis by A. A. Rano Nigeria Limited Filling Station.

**1.3.2** The proposed Aviation Turbine Kerosene (ATK) site occupies a total land area of 1.2377 Hectares.

Politically, Nigeria is divided into 36 states and the Federal Capital Territory, [Abuja](#)

***See the Appendices for the relevant drawings/ diagrams***

## **1.4 LEGAL AND ADMINISTRATIVE FRAMEWORK**

1.4.1 The national policy on Environment was published/launched in 1989 (by the Federal Environmental Protection Agency (FEPA) now Federal Ministry of Environment – established through the promulgation of Decree 58 of December 1988 and later Decree 59 of 1992 as amended and given the mandates by sections 16 and 17 of the Decree to protect, restore and preserve the ecosystems of the Nigerian Environment) with the goal to achieve sustainable development in Nigeria, and, in particular to:

- “(a) Secure for all Nigerians a quality of environment adequate for their health and well-being;
- (b) Conserve and use the environment and natural resources for the benefit of present and future generations;
- (c) Restore, maintain and enhance the ecosystem and ecological processes essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of living natural resources and ecosystems;
- (d) Raise public awareness and promote understanding of essential linkages between environment and development and to encourage individual and community participation in environmental improvement efforts; and
- (e) Cooperate in good faith with other countries international organizations/agencies to achieve optimal use of transboundary natural resources and effective prevention or abatement of transboundary environmental pollution.”



1.4.2 The strategies for achieving the above, as set in the National policy on Environment, is expected to lead to:

- “(a) The establishment of adequate environmental standards as well as the monitoring and evaluation of changes in the environment;
- (b) The publication and dissemination of relevant environmental data;
- (c) Prior environmental assessment of proposed activities which may affect the environment or the use of a natural resource”

1.4.3 In line with item ‘1.4.2’ paragraph (c)’ above, Decree No.86 of 10<sup>th</sup> December 1992 (Environmental Impact Assessment Decree 1992) was promulgated by the then Federal Military Government and published by the Federal Environmental Protection Agency (FEPA) now Federal Ministry of Environment.

1.4.4 The objectives of any Environmental Impact Assessment (Environmental Impact Assessment (EIA) is a formal appraisal of the likely effects of a proposed policy, programme, or project on the Environment, after various considerations to the proposal and measures to be adopted to protect the environment) are contained in section 1 page A979 of Environmental Impact Assessment Decree 1992;

Section 1 (a) states:

“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;”

Section 2 of the EIA Decree 1992 places restriction on public or private project without prior consideration of the environmental Impact; viz: 2- (1) –

“The public or private sector of the economy shall not undertake or embark or authorize projects or activities without prior consideration, at early stages, of their environmental effects;”

Sections 3 to 5 pages A980-A981 of EIA Act however contain the following classifications:

- i. Identification, etc., of significant environmental issues;
- ii. Minimum content of Environmental Impact Assessment;
- iii. Detail degree of environmental significance.

The schedule to section 13 of the EIA Act specifies the “Mandatory Study Activities” and items 12 (c) and 12 (e) under PETROLEUM state:

“(c) Construction of oil and gas separation; processing, handling, and storage facilities”.

“(e) Construction of product depots for the storage of petrol, gas or diesel (excluding service stations), which are located within 3 kilometres (km) of any commercial, industrial or residential areas and which have a combined storage capacity of 60,000 barrels or more”. ***1 barrel = 159 Litres (0.159 Cubic Metres).***

The proposed ATK Depot project, based on its scope and also combined storage capacity of 3,230,200 Litres (20,315.72 barrels), much less than the 60,000 barrels (9,540,000 Litres) minimum specified in the Act to make the list, may not necessarily fall within the Mandatory EIA study list; we have decided to register the project with the Ministry for the necessary guidance that will make its implementation wholly acceptable.

#### 1.4.5 DEPARTMENT OF PETROLEUM RESOURCES (DPR) GUIDELINES

The Petroleum Act of 1969 governs the Oil and Gas operations in Nigeria while its subsequent regulations made in pursuant to section 9 (i) B (ii) of the Act empowers the Minister of Petroleum Resources to make regulations for the prevention of pollution of water courses and the atmosphere.

The Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN), which was further reviewed in 2002 to adequately take into cognisance the need to enhance environmental resources prudently in the areas of its operation, was published by DPR in 1991. DPR’s EGASPIN requires that EIA study to assess all actions that will result in physical, chemical, biological, cultural and social (including health impact) modifications of the environment due to a new development/project, be undertaken and to predict their potential environmental impacts on the environment. Those projects that require mandatory EIA studies by DPR regulations are:

- (a) Drilling operations (exploratory, appraisal, and developments of well) for onshore and offshore areas;
- (b) Construction of Crude Oil and Gas production, Tank Farm and Terminal Facilities;
- (c) Laying of Crude Oil and Gas Delivery Lines, flow lines, and pipeline in excess of 50Km in total commutative length;
- (d) Hydrocarbon Processing Facilities, such as:

- Oil Refineries and Petrochemical Plants;
- Liquefied Natural Gas/Natural Gas Plants;
- Liquefied Petroleum Gas Plants (above 20,000 liters) located within 3Km of any commercial, individual or residential area;
- Blending Plants.

(e) Construction of Product Depot with combined capacity of 80,000 barrels and located within 3Km of any commercial, individual or residential area.

Based on the foregoing, the proposed ATK Depot project, with a combined storage capacity of 3,230,200 Litres (20,315.72 barrels), much less than the 80,000 barrels (12,720,000 Litres) minimum specified in the DPR regulations as requiring compulsory EIA, may not necessarily fall within the Mandatory EIA study list.

#### 1.4.6 TERRITORIAL LAWS

- (i.) Abuja Environmental Protection Board Act No. 10 of 1997 - Statutory  
Legislation applicable to 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 all ecological processes essential for the preservation of biological diversity.
- Protection and improvement in air, water, land, forest and wildlife in the ecology of the FCT.
- Municipal Liquid and Solid waste Collection and Disposal/Sanitation Management Services including i.e. connection of plot to the Central Sewer line.
- Pollution control and Environmental Health – Fumigation and Vector Control Services.

1.4.7 The above hence formed the basis of this Environmental Impact Assessment (EIA) being prepared on the **A. A. Rano Nigeria Limited's** ATK depot within Aviation Village, along Nnamdi Azikiwe International Airport Road, Abuja, FCT.

1.4.8 **A. A. Rano Nigeria Limited** has, to this end, already obtained some permits from some Governmental Bodies relevant to the successful execution of the object of the project.

**See the Appendices for the relevant Permits already obtained.**

## **1.5 TERMS OF REFERENCE (TOR)**

In order to successfully implement the EIA, **A. A. Rano Nigeria Limited** has prepared this document (TOR), which provides basic information on the project activities, the environment, scope of study to be carried out and the issues that will be focused on during the EIA process.

The scope of the study that will include the following:

- A description of the project, the reason for the project;
- Other methods of carrying out this project;
- Alternatives to the project;
- A description of the present environmental (valued ecosystem component) to be affected;
- A description of the future environment should the project not proceed;
- The impacts that may be caused to the environment;
- Actions to alter or remedy the impacts on the environment (rehabilitation);
- An evaluation of the advantages and disadvantages to the environment of the planned depot facility;
- Measures to minimise all significant harmful impacts (mitigation);
- A proposal to monitor harmful impacts during construction and operation;
- Proposals for a programme of public information;
- Environmental Management Plan for the facility.

1.5.1 **A. A. Rano Nigeria Limited** recognizes the need for well-planned site visits, field survey and secondary data acquisition from existing reports and publications, using best available data acquisition technologies, such as: GIS and Remote Sensing Technologies (RST); Spatially Referenced Data (SRD) will also be derived, obtained, displayed and utilized for impact analyses, interpretation and decision-making processes.

### **1.5.2 Terms of Reference (TOR) Organisation**

The TOR is organised into Five (5) sections and an appendix (References) as stated below:

**Section 1:** Introduction and Background Information

**Section 2 :** Preliminary Project Information and Schedule

**Section 3:** The EIA Process and Relevant Regulations

**Section 4:** The Proposed Project Environment

**Section 5:** Scope of Work and Anticipated Coverage of the EIA

**References:**

**Appendices:** Pictures, Drawings and Diagrams relevant to the Proposed Depot Project;  
Some Permits from Governmental Bodies already obtained by **A. A. Rano Nigeria Limited**.

## SECTION 2

### 2.0 PRELIMINARY PROJECT INFORMATION AND SCHEDULE

#### 2.1 INTRODUCTION

2.1.1 The **A. A. Rano Nigeria Limited's** Proposed Aviation Turbine Kerosene (ATK) Depot Facility is designed to handle refined Petroleum Products at Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council, Abuja, FCT, Nigeria. The Depot Facility's design has provision for receiving products from tank trucks, storage of the products into Ground-supported, flat bottom tanks, and loading of products into refueller trucks.

2.1.2 The planned Aviation Turbine Kerosene (ATK) Depot Facility will be located on a parcel of land, on which a form of soil improvement will be required to be carried out before the adoption of shallow foundation. Pilling is the form of Soil Improvement Technique to be adopted in line with the findings/recommendations contained in the Geotechnical Investigation Report.

**See the Appendices for the relevant photos, drawings/ diagrams**

2.1.3 The peculiar nature of the proposed depot Facility's site environment has been taken into consideration in designing the Fuel Depot, to ensure optimum product reliability and throughput, and community/environmental welfare and safety, through quality assurance, logistics/traffic management.

2.1.4 The designed total storage capacity of the Aviation Turbine Kerosene (ATK) Depot is 3,230.2 Cubic Metres, which will be made up of:

- 1 – Vertical ATK Tank of 2,000 Cubic Metres effective capacity;
- – Vertical ATK Tanks of 502 Cubic Metres effective capacity each, thereby making a total of 1004 Cubic Metres effective capacity;
- – Horizontal ATK Tanks of 75.4 Cubic Metres Effective capacity each, thereby making a total of 226.2 Cubic Metres Effective capacity.

In addition to the above, the facility will have a 1,275 Cubic Metres (effective capacity) tank of fresh water for firefighting purposes; and 1 No. Slop Tank of 30 Cubic Metres effective capacity.

## **2.2 SCOPE OF PROJECT**

2.2.1 The project shall include the construction/installation of:

1. Raft foundations for tanks bases, bund walls and pump bases;
2. Construction of tank bases, pump foundation, bund wall, and loading bay floors;
3. Construction of 3 – Vertical ATK Tanks with total effective capacity of 3,004,000 Litres (1 No. of 2,000,000 Litres capacity and 2 Nos. of 502,000 Litres capacity each); and  
3 – Horizontal ATK Tanks with total effective capacity of 226,200 Litres (75,400 Litres capacity each).
4. Loading Island with capacity for loading four (4) refueller trucks at a time.
5. Trucks Parking Lot:  
A Trucks Withholding Bay with capacity for 30 Trucks within the proposed depot site, is planned along with the proposed project;
6. One (1) Slop Tank with capacity of 30,000 Litres:  
Slop tanks are used to separate and recover leaked or spilled oil products from wastewater or storm water gathered from within bund walls, etc.
7. Three (3) Monitoring Wells:  
These wells are required to monitor the quality of ground water and to observe incase of any seepages or oil pollution arising from the operation of the depot.
8. Bund Walls (with capacity for 120% of the storage capacity of bunded tank):  
The bund walls are to collect any spillage during operations or rupture of refined petroleum products' storage tanks. Besides the above, it gathers storm water around the petroleum products tanks, which is then channeled to the slop tanks for separation using the gravity - floatation process.
9. An Admin Building, consisting of:
  - i.) Offices;
  - ii.) Toilets;
  - iii.) Conference Room;
  - iv.) Maintenance Office;
  - v.) Laboratory, etc.
  - vi.) Utilities Section;
  - vii.) Switchgear Room;
  - viii.) Control Panels

10. Pump House – comprising 4 Nos. Pumps:

- i.) 3 - Nos. Product Pumps - loading and unloading;
- ii.) 1 - No. Flush Pump;

11. Other Associated Facilities

See Appendices for layout.

Other associated facilities that will be provided for the smooth and sustainable operation of the tank farm are: -

- i.) Car park;
- ii.) Security House;
- iii.) Foam Bladder Tank;
- iv.) Generators Shed;
- v.) Water Treatment Plant;
- vi.) Oil - Water Separator;
- vii.) National Grid Installation - 11,000V medium tension;
- viii.) 650 KVA Transformer;
- ix.) 2 Nos. Electricity Generating Machines;
  - a.) 1 No. 500 KVA;
  - b.) 1 No. 100 KVA.
- x.) Fresh Water Storage Tank (1,275,000 litres);  
An industrial borehole shall be sunk and the water from it will be used for firefighting, cooling of tanks and for other uses;
- xi.) Soak away Tank  
See Appendices for layout;
- xii.) Septic Tank

## **2.3 PROJECT DESIGN CRITERIA**

### **2.3.1 Facility Development and Operation**

A feasibility study was done for the erection of a Refined Petroleum Products Handling Facility in Abuja FCT, within the Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council, Abuja, FCT, a place specifically laid out for projects of this type, by the Federal Aviation Authority of Nigeria (FAAN). The Pilling is the form of Soil Improvement Technique to be adopted in line with the findings/recommendations contained in the Geotechnical Investigation Report.

**The main activities to be carried out through the project are:**

- ◆ Receiving of Petroleum Products from refineries/through import by vessels;
- ◆ Storage of Aviation Turbine Kerosene (ATK);
- ◆ Loading and delivery of the above stated products to tankers.

**The key design parameters for the Depot Facility are:**

**See the Appendices for the relevant drawings/ diagrams**

- The facility will be supplied via discharge from road trucks;
- To ensure product quality, filtration unit is to be installed along flow paths of all petroleum products pumped to trucks;
- There is Trucks' Withholding Bay with capacity for 30 Trucks within the proposed depot site, planned along with the proposed project.

**2.3.2 Redundancy and Facility Availability**

- The facility is designed to operate 24 hours a day, 7days a week, with one week per year allowed for planned maintenance or a 98% availability.
- All critical equipment are designed to have one unit in operation and one on standby with the exception of the product transfer pump. The piping system is designed so that pumps can take suction from different storage tanks to provide the necessary redundancy.
- Non-control valves are designed with double block and bypass so that the facility can be operated manually when maintenance is required on the control valves.
- Instrumentation and control valves at individual loading bays will not have redundancy, as the facility would be able to operate at optimum capacity without one of the loading arms.
- Maintenance and statutory inspections of the storage tanks will be performed during the planned maintenance, allowed for.
- Firewater system is designed with two main pumps (1 – Electrically Operated and 1 – with Diesel Engine) and a single jockey pump. One pumps will be required in the event of fire. The second pump is provided as backup.

**2.3.3 Fire prevention and Protection Design Philosophy**

- A firewater tank of 502m<sup>3</sup> is provided on site with sufficient capacity for sustaining the firewater spray system and tank foam pouring for at least 30minutes (20minutes required by NFPA, based on top of a tank fixed foam pouring system).
- The minimum application rate of foam to the tanks is 12.2 l/ min m<sup>2</sup> and to the bund 4.1 l/min m<sup>2</sup>.
- The firewater spray system will be applied to vertical surfaces of tanks as fire protection.



### 2.3.4 Applicable Design, Codes and Standards

The Tankfarm Facility's design is in conformance with the following International/Local Design, Codes and Standards:

<b>DESIGN, CODES STANDARDS</b>		
1.0	WELDED STEEL TANK	API 650 (LATEST) & ASME SEC IX & V
2.0	BOTTOM PLATE THICKNESS	8mm – 12mm
3.0	COROSION ALLOWANCE	3mm
4.0	DESIGN WIND LOAD	100m/hr
5.0	INTERTANK SPACE (MIN)	10m (API 2610)
6.0	EARTHQUAKE	NOT APPLICABLE
7.0	SAND BLASTING	NACE No. 2/SSPC-SP10
8.0	ELECTRIC CODE	NIGERIA STANDARD
9.0	CONCRETE	BS 8110 Part 1 & BS Part 1,2,3&4
10.0	CARBON STEEL	BS 4449
11.0	FOUNDATION	BS 8004
12.0	EARTH WORKS	CP 2004
13.0	FIRE PROTECTION	NFPA
14.0	PIPING	API 1104
15.0	PLANT BUILDINGS	UNIFIED BUILDING CODE

## 2.4 CONTINGENCY PLANS:

2.4.0 Due to the nature of activities to be carried on through the project and the anticipated possible occurrence (though rare) of:

- (i.) Noise;
- (ii.) Lightning;
- (iii.) Fire/explosion and
- (iv) Oil spillage; the following have been provided/planned with the project:

### 2.4.1 Soundproofing for the Generators

2.4.1.1 To guide against noise levels within the project site being above FMEnv/DPR/AEPB limits as could occur through the use of generators during power outages from PHCN, all the Electricity Generating Machines being specified for the project be soundproofed.

## **2.4.2 Lightning Prevention Device**

2.4.2.1 Units of this device form part of the installations on the new project site. The devices will protect the entire project installation against damage from lightning.

## **2.4.3 Fire Prevention/Fighting System**

2.4.3.1 Planned along with the project is the installation of the comprehensive fire prevention and fighting system incorporating the following:

- (a) Prevention/Detection System;
- (b) Pump Station;
- (c) Foam System;
- (d) Tank Cooling System;

2.4.3.2 All the above are connected to a Control Panel in the Utilities Building.

2.4.3.3 And in addition to the above:

- ◆ There is the Fire Alarm Control Panel connected to the Smoke Detector in all offices and generator/electrical room, and all alarm sirens;
- ◆ There are Foam Monitors and Water Hydrant Points (each to be located at strategic positions) round the entire plant.

### **2.4.4 (a)i Prevention System**

2.4.4 (a)i/1 The involves basic checks, techniques/procedures to ensure the possible occurrence of fire incidence is negated or otherwise brought to the barest minimum.

Included under this programme are:

- Engagement and training (regularly) of Firemen;
- Undertaking regular fire drills;
- General awareness creation/training of all staff on causes of fire, its prevention and mode of extinguishing it;
- Ensuring the all vehicles entering the depot have Flame Arrestors installed on their Exhaust Outlet;
- Ensuring that only properly earthed Trucks are allowed to enter the depot for loading with products.

### **2.4.4 (a)ii Detection System:**

2.4.4 (a)ii/1 This consists of:

- ◆ Heat Detectors located on tank roofs;

- ◆ Flame Detectors located at the API Separator (Oil – Water Separator), Haulage Area and Pump Shed;
- ◆ Heat Sensitive Cables within the Loading Bay.

2.4.4 (a)ii/2 In the event of a fire, these detectors send signals to the control panel, following which the station activates the Deluge Valve of concerned area. The deluge valve automatically switches on the foam and water pumps thereby permitting them to mix, thus forming foam/water solution that pass through the deluge valve, nozzles, branch pipes and monitors, and into the concerned area thus putting off the fire.

#### **2.4.5 Pump Station:**

2.4.5/1 This Station has:

- ◆ Main pump for delivering water with a diesel pump as reserve;
- ◆ Foam pump for foam concentrate;
- ◆ Jockey pump to maintain constant pressure in the hydrant circuit;
- ◆ Foam concentrate tank.

#### **2.4.6 Foam System:**

2.4.6/1 This consists of:

- ◆ Deluge Valves
- ◆ Branch –pipes;
- ◆ Nozzles;
- ◆ Foam Monitors

2.4.6/2 The deluge valves are arranged in zones to protect designated areas. Such designated areas include:

- ◆ Tank Area;
- ◆ Pump Shed;
- ◆ Haulage Area;
- ◆ API Separator;
- ◆ Loading Bay.

#### **2.4.7 Tank Cooling System:**

2.4.7/1 Each of the tanks will be protected by a ring of water nozzles that cool the surface area of the tanks. The system will operate when the roof detectors signal an increase in temperature above a preset level to the control panel.

2.4.7/2 In addition to the above, the following provisions are also available in the new project plan:

- ◆ Foam/Water Monitors will be located in the perimeter of the Depot to cover various zones;
- ◆ Water Hydrants will be located in various zones each covering a radius of about 50 metres by hose;
- ◆ Offices, the Electrical room and Fire Fighting House will be covered by smoke detectors located at the ceilings;
- ◆ Various Fire Extinguishers are to be located at strategic positions within the depot;
- ◆ Sand Baths equipped with trowels are to be located at strategic positions within the depot.

2.4.7/3 From the borehole, water is pumped into an overhead storage tank of capacity – 502,000 litres.

2.4.7/4 The new installation Fire Station is to have two (2) centrifugal pumps. One (1) electrically operated and the other diesel powered.

2.4.7/5 This also serves as a measure towards easy containment of any form of spillage; and early stoppage of fire incidence occasioned by spillage, as everything will flow towards one point where such fire is easily extinguished.

2.4.7/6 It is from this central point that water goes into the API Separator (Oil – Water Separator).

#### **2.4.8 Oil/Water Separation:**

2.4.8/1 As discussed above, all free-flowing waters within the premises will flow towards a central collection point from where they will be then go into the API Separator.

2.4.8/2 The API Separator is an Oil / Water separator designed to the standards set by the American Petroleum Institute.

2.4.8/3 This three-chamber tank operating on the principle of gravity separation between oil and water permits oil-free water to flow out from under while oil is trapped on the water surface above.

2.4.8/4 The so trapped oil is later to be skimmed and temporarily stored in the underground tank beside the API Separator, prior to proper disposal through authorized bodies.

**2.4.9 Monitoring Wells:**

2.4.9/1 As an addition move towards Ground Water Protection, three (3) Monitoring Wells will be sunk on the project site and stabilized for periodic sampling for detection of leakages and possible underground water/soil contamination.

## **SECTION 3**

### **3.0 THE EIA PROCESS AND RELEVANT REGULATIONS**

#### **3.1 RELEVANT LEGISLATION**

The statutory requirements for EIA by the Federal Ministry of Environment (FMEnv) and the Department of Petroleum Resources (DPR) Guidelines serve as the basis for **A. A. Rano Nigeria Limited**.

The specific regulations are:

- The Department of Petroleum Resources Environmental Guidelines and Standards for the Petroleum Industry in Nigeria issued in 1991 and amended in 2002;
- The Federal Environmental Protection Agency (FEPA) Environmental Impact Assessment Decree No. 86 of 1992;

There are, however, other legislations that are relevant to this Tankfarm Project.

#### **3.2 INTERNATIONAL REGULATIONS**

The relevant International Legislations include the following:

- International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (Oilpol, 1954);
- Convention on the High Seas, 1958;
- The Abidjan Convention and Marpol 73/78;
- International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990

#### **3.3 RELEVANT NATIONAL LEGISLATION**

The other relevant National Legislations include the following:

- The Petroleum Act, 1969
- DPR Environmental Guidelines and Standards for the Petroleum Industry in Nigeria, 2002.
- S.I.8 National Effluents Limitations Regulations (FEPA), 1991.
- S.I.9 FEPA National Pollution Abatement in Industries Generating Wastes Regulations, 1991.
- S.I.15 FEPA Management of Solid Wastes and Hazardous Wastes Regulations, 1991.
- Environmental Impact Assessment Decree 86, 1992

- FEPA EIA Procedural Guideline, 1994
- FEPA EIA Sectoral Guidelines for Oil and Gas Industries 1995.

### **3.4 RELEVANT TERRITORIAL LEGISLATION**

The other relevant National Legislations include the following:

- Abuja Environmental Protection Board Act No. 10 of 1997 - Statutory Legislation applicable to Federal Capital Territory Abuja

**Though the proposed ATK Depot project, based on its scope and also combined storage capacity of 3,230,200 Litres (20,315.72 barrels), much less than the 60,000 barrels (9,540,000 Litres) minimum specified in the Act (and much less than the 80,000 barrels (12,720,000 Litres) minimum specified in the EGASPIN) to make the list, may not necessarily fall within the Mandatory EIA study list; we have decided to register the project with the Ministry / Department for the necessary guidance that will make its implementation wholly acceptable.**

## **SECTION 4**

### **4.0 PRELIMINARY ENVIRONMENTAL CONDITIONS AROUND THE PROJECT AREA**

#### **4.1 INTRODUCTION**

This section presents preliminary information on the environment of the project area. The information will be gathered from several sources, which include shall include but not limited to:

- First hand information on the general area;
- Previous work in the area and areas with similar environmental characteristics;
- Field Surveys (including samples taking and analyses).

#### **4.2 ENVIRONMENTAL CONDITIONS**

4.2.1 The quality of the environment as concerns the proposed project prior to its implementation shall be discussed under the following attributes; the studies will be conducted for the one (1) season:

##### **4.2.1.1 AIR/NOISE**

- ◆ Green House Gas (GHG);
- ◆ Diffusion Factor;
- ◆ Particulates;
- ◆ Sulfur Dioxide;
- ◆ Hydrocarbons;
- ◆ Carbon Monoxide;
- ◆ Nitrogen Oxide;
- ◆ Oxidants;
- ◆ Volatile Organic Compounds (VOC);
- ◆ Suspended Particulate Matters;
- ◆ CO<sub>2</sub>.S



#### **4.2.1.2 WATER**

Ground Water and Surface Water Samples will be taken and analysed for the following parameters, as the site is not close to any free-flowing water body:

- ◆ pH;
- ◆ Heavy Metals (Cu, Mg, Zn, Hg, Pb);
- ◆ Chloride;
- ◆ Nitrate as NO<sub>3</sub>;
- ◆ Ammonia;
- ◆ Salinity;
- ◆ Flow Pattern;
- ◆ Turbidity;
- ◆ Biochemical Oxygen Demand (BOD);
- ◆ Chemical Oxygen Demand (COD)
- ◆ Dissolved Oxygen (DO);
- ◆ Phosphates;
- ◆ Hazardous Substances;
- ◆ Microbiological Parameters (Total Plate Count, Total Coliform Count, etc).

#### **4.2.1.3 ECOLOGY**

- ◆ Habitat;
- ◆ Diversity;
- ◆ Endangered Species;
- ◆ Marine Birds; Mammals; Reptiles and Amphibians;
- ◆ Fisheries, Plankton and Benthic Invertebrates.

#### **4.2.1.4 AESTHETIC QUALITY**

- ◆ Appearance;
- ◆ Land/Water Interface;
- ◆ Floating Materials;
- ◆ Wooded Shoreline.

#### **4.2.1.5 LAND/SOIL**

- ◆ Specific parameters of land-use patterns;
- ◆ Soil Erosion
- ◆ Aesthetic Quality;
- ◆ Microbiology;

#### **4.2.1.6 SOCIO-ECONOMY**

- ◆ Demography;
- ◆ Life Patterns;
- ◆ Cultures;
- ◆ Existing Historical/Scientific Packages;
- ◆ Areas of ecological interest.

## **SECTION 5**

### **5.0 SCOPE OF WORK AND ANTICIPATED COVERAGE OF THE EIA**

#### **5.1 INTRODUCTION**

5.1.1 EIA is usually carried out prior to an activity's commencement, to assess the Potential Environmental and Social Impacts of a proposed developmental activity. It is an Environmental Management Tool that provides a Project Proponent fore knowledge of the likely impacts that may arise from a planned development (or any activity whatsoever that may adversely affect the environment or alter/change the ecosystem balance), with a view to mitigating and minimizing the environmental impact.

5.1.2 The EIA process ends in Environmental Impact Statement (EIS).

##### **5.1.3 Procedure for the EIA**

The EIA shall give:

- a) Information on the proposed project activity in respect of the Nature, Scope and Size of the Project. The information that will be presented, will cover the following stages of the project:
  1. Planning;
  2. Design;
  3. Construction;
  4. Operation and Maintenance;
  5. Decommissioning/Abandonment.
- b) Detailed description of the existing environment of the area to be covered by the proposed project.
- c) Qualitative and quantitative forecast of associated potential and identified impacts. The impact forecast methods will be discussed.
- d) Mitigation measures against negative environmental impacts identified based on "(c)" as stated above.
- e) Alternative options, if necessary.
- f) Information on Environmental Monitoring and Management Plan for the development.
- g) Planned Decommissioning/Abandonment Programme.

### **5.1.4 Data Collection**

5.1.4-1 As the location of the proposed A. A. Rano Nigeria Limited's ATK Depot is, within the Aviation Village, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council, Abuja, FCT, a place specifically laid out for projects of this type, by the Federal Aviation Authority of Nigeria (FAAN), with the EIA of the general area haven been conducted and based on the Department's likely permission for a single season data gathering, we will undertake one season data gathering and then also leverage on the data contained in the EMP (2019) of Everlink Telesat Network Limited (where twenty-two (22) samples were collected), which has its Four Star Hotel project, also along Nnamdi Azikiwe International Airport, Aviation Village, just as A. A. Rano Nigeria Limited's ATK Depot, though a different project; about 1.85km away and sharing same geographical and ecological characteristics..

5.1.5 Data gathering activities will revolve mainly around documenting the existing environmental baseline data on the study area prior to the commencement of the proposed project activities. Hence, the following will be undertaken:

- Intensive and extensive literature review and data collection;
- One Season (wet) field sampling and data analyses, which will involve the following:
  - Ground water Sampling Points - 2 Nos + Control;
  - Soil Sampling Points - 7 Nos + Control;
  - Ambient Air Quality Measuring Points- 5 Nos (in-situ @ different elevations);
  - Noise Level Measuring Points - 5 Nos (in-situ);
  - Ecology - 5 Nos + Control;
- Reports preparation

5.1.6 The overall scope of the EIA will, however, cover the following environmental attributes:

- Land use and Environmental Sensitivity;
- Socio-cultural and Health Status Assessment;
- Vegetation Analyses;
- Wildlife and Fisheries Assessment;
- Soil Studies;
- Groundwater Sampling;
- Air Quality Sampling and Noise Level Measurement; and
- Waste Management, Transportation and Utilities Studies.

5.1.7 The major issues that shall be considered, during the EIA include the following:

- I. Accidental spills of petroleum products and the anticipated impacts on aquatic ecosystems;
- II. Gaseous and dust emissions from generating sets, pumps and other associated machinery during construction;
- III. Effects on traffic pattern in the area both during construction and the operation of the facilities;
- IV. Type, quantity and handling of wastes;
- V. Potential disturbance (short-/long-term) of residential, industrial and other business areas;
- VI. Environmental Monitoring and Management Plan;

### **5.1.8 Impacts' Assessment**

Environmental Impact Assessments (EIA), Social Impact Assessments (SIA) and Health Impact Assessments (HIA) will all be carried out in line with Local Regulatory Requirements and Internationally Accepted Methods.

The assessment of impact will involve:

- Screening;
- Impact Identification;
- Qualification and Quantification,

using standard methods.

## **REFERENCES**

- Adegbihin, J. O. and Nwaigbo, L. C. (1990). Mangrove Resources in Nigeria: Uses and Management Perspectives. *Nature and Resources*, Vol. 26, n 2, 13 – 20;
- (Advance Copy) UNITED NATIONS, Economic and Social Council; Draft Elements for a Protocol on Strategic Environmental Assessment, 8 March 2001;
- Ajao, E. A. (1990): A Study of the Sediments and Communities in Lagos Lagoon, Nigeria, *Oil and Chemical Pollution*. 7, 85-117;
- Ajao, E. A. (1991). Environmental Problems in Coastal Fish Production in Nigeria. In : Proceedings of the 4<sup>th</sup> Annual Seminar of CODRI, ed. J. G. Tobor and B.I.O. Ezenwa. NIOMR 125 – 131;
- Ajao, E. O. (1993): Mangrove Ecosystem in Nigeria : In Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11- pp155 – 167;
- Ann L. Riley, *Restoring Streams in Cities - A Guide to Policy Makers, and Citizens*; Island Press, Washington DC
- Ayeni, J.S.O., Afolayan, T.A. and Ajayi, S.S.(1983). *Introductory Handbook on Nigerian Wildlife*. Saclog Production, Ilorin Nigeria, 80pp;
- Borky S. G. Bakre & Associates (2001). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Beachland Estate, Apapa by Obat Oil & Petroleum Limited;
- Borky S. G. Bakre & Associates (1999). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Kayode Street, Apapa by Agip/Elf Joint Venture;
- Borky S. G. Bakre & Associates (2009). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at 25, Creek Road Apapa, by Cottoil Limited;
- John G. Rau David C. Wooten, *Environmental Impact Analysis Handbook*; McGRAW-HILL BOOK COMPANY;
- Canadian International Development Agency; *Environmental Assessment – About Environmental Assessment*, September 4, 2004;
- Carmelo, R. T. (1997): *Identifying Marine Phytoplankton*. Academic Press, London. 858p;

- Chapman, J. R. (1965). Keys to Nigerian species of “Rhizophora” (from Fed. Forestry Research);
- Chapman, V. J. (1970). Mangrove Phytosociology. Trop. Ecol., 11. pp. 1 – 19;
- Charter, J. R. (1971). Nigeria,s wild life: a forgotten asset. IUCN Publ. New series, Morges, Switzerland;
- Charter, J. R. (1970). The economic value of wildlife in Nigeria. First Annual Conference of Forestry Association of Nigeria. Univ. of Ibadan;
- Davis, A. Richards Jr. (1975): Principles of Oceanography: PLANKTON Chapter 16. Cambridge Univ. Press, pp 226 –276;
- Department of Petroleum Resources (2002). Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGAPSIN);
- Diops, E. S. (1993): Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11;
- Dodge, J. D. (1985): Atlas of Dinoflagellates: A Scanning Electron Microscope Study. Ferrand Press, London. 119p;
- Dodge, J. D. (1973): Marine Dinoflagellates of the British Isles. Her Majesty Stationery Office, London. 303p;
- Dublin-Green, C. O. and Ojanuga, A. G. (1988). The Problem of Acid Sulphate Soils in Brackish Water Aquaculture. A preliminary Study of Soils of NIOMR/ARAC Fish Farm, Buguma, River State, Nigeria, NIOMR Tech. paper No. 45; 20pp
- European Commission Guidance on EIA/EIS Review (European Commission, 2001);
- FAO/UNEP. (1981). Tropical Forest Resources Assessment Project. Forest Resources of Tropical Africa. Part II country brief. FAO, Rome;
- FEPA (1991). National Environmental Protection (Effluent Limitation) Régulations. Federal Environmental Protection Agency, Nigeria;
- FEPA (1992). Environmental Impact Assessment (Decree No. 86, 1992) - Procedural Guideline. Federal Environmental Protection Agency, Nigeria;
- FEPA (1995). Environmental Impact Assessment Sectoral Guidelines: Oil and Gas Industry Projects. Federal Environmental Protection Agency, Nigeria;

Fischer, W., Bianchi, G and Scott, W.B. (1981). FAO Species Identification Sheets for Fishery Purposes for the East Central Atlantic, Fishing area 34, 47 (in part). Vol. 1 – 1V;

Fraser, J. H. (1965): Zooplankton Indicator Species in the North Sea. In Serial Atlas of the Marine Environment, Folio 8 American Geographical Society. 219p;

Gibbons, J. Mark (2003): An Introduction to the Zooplankton of the Benguela Current Region. 51p;

Government of Newfoundland & Labrador, Department of Environment; Policy Directive: Environmental Assessment Procedure, December 10, 1986;

Hallegraeff, G. M., Anderson, D. M. and Cembella, A. D. (Eds). (1995): Manual on Harmful Marine Micro-Algae. UNESCO Press, France. 551p;

Hardy, A. C. (1956): The Open Sea, Its Natural History: The World of Plankton. London, Collins. 335p;

Hoek, C. V. D., Mann, D. G. and Jahns, H. M. (1995): ALGAE: An Introduction to Phycology. Cambridge University Press. 622p;

Inter-American Development Bank – IDB Training Program: Trainers' Course on Environmental Management and Assessment for Investment Projects (2002);

IOC-DANIDA UNESCO (1999): A Compilation of Harmful Micro-Algae of the World in Photograph: IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Algae. UNESCO PUB. 86p;

Isebor, C. E. and Awosika, L. F. (1993): Nigerian Mangrove Resources: Status and Management: In Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions : Mangrove Technical Report: ITTO/ISME Project PD114/90 Part 11 pp 169 – 185;

Ita, E. O. (1994). Aquatic Plants and Wetland Wildlife Resources of Nigeria. CIFA Occasional Paper No. 21, FAO Pub. CIFA/OP 21. pp.52;

John Zetter, Planning Directorate, Department of the Environment, United Kingdom; Policies for Creating Environmentally Sound Industries, September 1996;

Keay, R.W. J. (1958): Marine Bottom Communities, Biol. Rev. 25: 283-313;

Kio, P.R.O. (1983). Management Potentials of the Tropical High Forest with Special Reference to Nigeria. In: Tropical Rainforest: Ecology and Management. Sutton, Whitmore and Chadwick;

Lagos State Education Management System/Min. of Education;



- Lagos State Environmental Protection Agency Edict (Edict No. 9, 1996);
- Lagos State Regional Plan (1980-2000), published by Ministry of Economic Planning and Land Matters, Urban and Regional Planning Division, Lagos State Secretariat;
- Lawson, G.W. (1986) Coastal Vegetation, Chapter 8 pp.195-213, in: G.W. Lawson (ed) Plant ecology in West Africa. John Wiley, Chichester, 357p;
- Longhurst, A. R. (1965): The Coastal Oceanography of the Gulf of Guinea. Bull. IFAN XXV1 (A) no. 2;
- Longhurst, A. R. (1958): The Ecological Survey of the West African Marine Benthos. Colonial Office Fisheries Publication. No. 11, 102pp;
- Moses, B. S. (1985). Mangrove Swamps as a Potential Food Sources in Balafauna;
- Newell, G. E. and R. C. Newell (1977): Marine Plankton: A Practical Guide. Hutchinson, London. 244p;
- Nigerian Meteorological Agency (NIMET), Oshodi, Lagos (2007);
- Nwankwo, D. I. (2004): THE MICRO ALGAE: Our Indispensable Allies in Aquatic Monitoring and Biodiversity Sustainability. Inaugural Lecture Series. University of Lagos Press. 44p;
- Office for Official Publications of the European Communities' Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (May 1999);
- Okigbo, L. C. (1984). Potentials for Mangrove Utilization in Nigeria. Skoup and C, Enugu. 14<sup>th</sup> Annual Conference of the Forestry Association of Nigeria, pp. 127 – 140. Univ. of Ibadan;
- Olaniyan, C. I. O. (1968): An Introduction to West African Animal Ecology, Heinemann Educational Books, Ltd London. 167pp;
- Omori, M. and T. Ikeda (1984): Methods in Marine Zooplankton Ecology. John Wiley & Sons Inc. 311p;
- Owre, H. B. and Foyo, M. (1964): FAUNA CARIBAEA: NUMBER 1: CRUSTACEA, PART 1: COPEPODA: Copepods of the Florida Current, with illustrated Keys to Genera and Species. Institute of Marine Science, Univ. of Miami Press. 136p;
- Oyebanji, M.O., Kusemiju, K., and Nwankwo, D. I. (1999): A Survey of the Plankton and the Physico-chemical Parameters of Lagos Lagoon. Gulf of Guinea Large Marine Ecosystem Project Publication;

Oyebanji, M. O., Ikusemiju, K. and Nwankwo, D. I. (1996): The Physico-chemical Fluctuation and Plankton Distribution and Abundance of the Lagos Lagoon in Lagos. Study submitted to GCLME Project of UNIDO;

Raymont, J. E. R. (1963): Pure and Applied Biology, International Series of Monographs: Plankton and Productivity in the Oceans. Pergamon Press, London. 660p;

Richards, P. W. (1939). Ecological Studies on the Rain Forest of Southern Nigeria. In: The Structure and Floristic Composition of the Primary Forest. *Journal of Ecology* **27**: 1-61;

Rosevear, D. R. (1954). Vegetation and Forestry. In: The Nigeria Handbook. Lagos, Nigeria: The Government Printer;

Schiotz, A. (1963). Amphibians of Nigeria. *Vidensk Medd. GRA. Dansk. Naturh Foren*, 125; 1 – 92;

The World Bank Environmental Assessment Sourcebook (Vol. 1 and 3);

Todd, C. D. and M. S. Laverack (1991): Coastal Marine Zooplankton: A Practical Manual for Students. Cambridge Univ. Press pub. 65p;

Triple "E" Systems Associates Limited (2004). Draft Environmental Impact Assessment Report for the Proposed Petroleum Products Tankfarm at Creek Road, Apapa by Folawiyo and Sons Limited;

Wiaffe, G and Chris, L. J. F. (2001): Marine Zooplankton of West Africa: A Darwin Initiative Report 5, Ref. 162/7/451.; University of Ghana and University of Newcastle Joint pub. 120p;

Wilcox, H. P. and Powell, C. B. (Eds.). Proceedings of a Workshop on Mangrove Ecosystem of the Niger Delta, pp. 177 – 184. Univ. of Port Harcourt, Nigeria;

Wolfgang, S. (1990). Field Guide to the Commercial Marine Resources of the Gulf of Guinea. FAO Document. RAFR/90/2. pp.288;

World Bank Report on Household Survey, 2006;

[www.nigeriacongress.org](http://www.nigeriacongress.org);

[www.nigerianmuse.com](http://www.nigerianmuse.com);

2007 Cimate-charts.com;

2004 Oxford Cartographers;

2007 Wikipedia.org;

Borky S. G. Bakre & Associates (2011). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by First Deepwater Discovery Limited;

United Nations Environment Programme UNEP (Division of Technology, Industry and Economics and Trade Branch). Environmental Impact Assessment Training Resource Manual (Second Edition 2002);

Environmental Integration Handbook for European Commission Development Co-operation (2006);

Borky S. G. Bakre & Associates (2015). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by A. A. Rano Nigeria Limited;

Borky S. G. Bakre & Associates (2015). Final Environmental Impact Assessment Report for the Proposed Refined Liquid Petroleum Products Tankfarm at Ijegun-Egba, Satellite Town, Amuwo-Odofin LGA, Lagos State, by MAO Petroleum Company Limited;

## **APPENDICES**

1. Some Photos of Locations and Facilities on and around the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT.
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6. Survey Map of the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT.
7. Sampling Map (Proposed for Data Gathering Exercises).

**SOME PHOTOS OF LOCATIONS AND FACILITIES ON AND AROUND THE PROPOSED PROJECT SITE**



**Plate 1: Proposed Project Site from the North-Western Axis**



**Plate 2: Proposed Project Site from the North-Western Axis**



**Plate 3: Proposed Project Site from the Northern Axis**



**Plate 4: Proposed Project Site from the South-Eastern Axis**



**Plate 5: Proposed Project Site from the North-Eastern Axis**



**Plate 6: Proposed Project Site from the North-Western Axis**

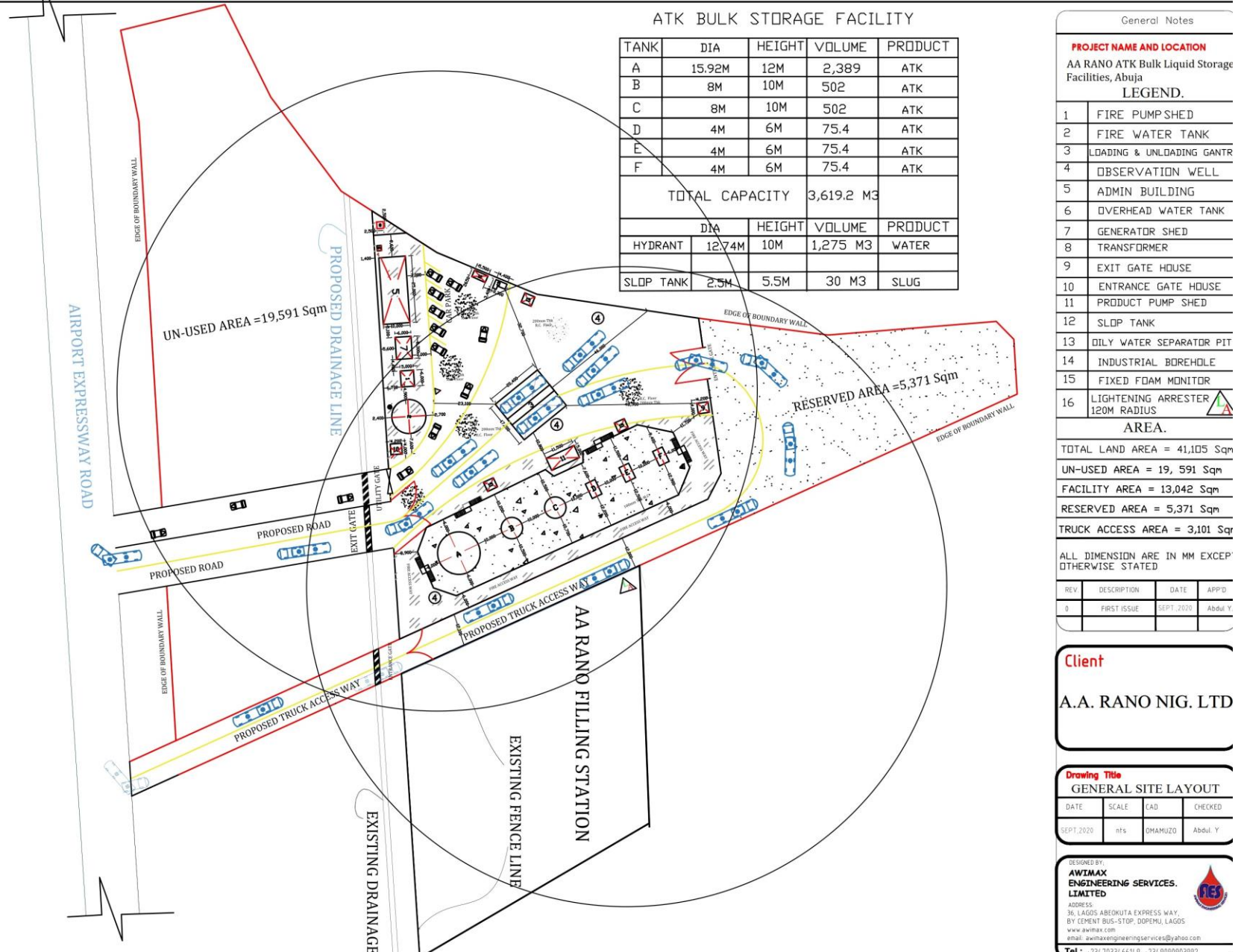


**Plate 7: Southern Axis of the Proposed Project Site**

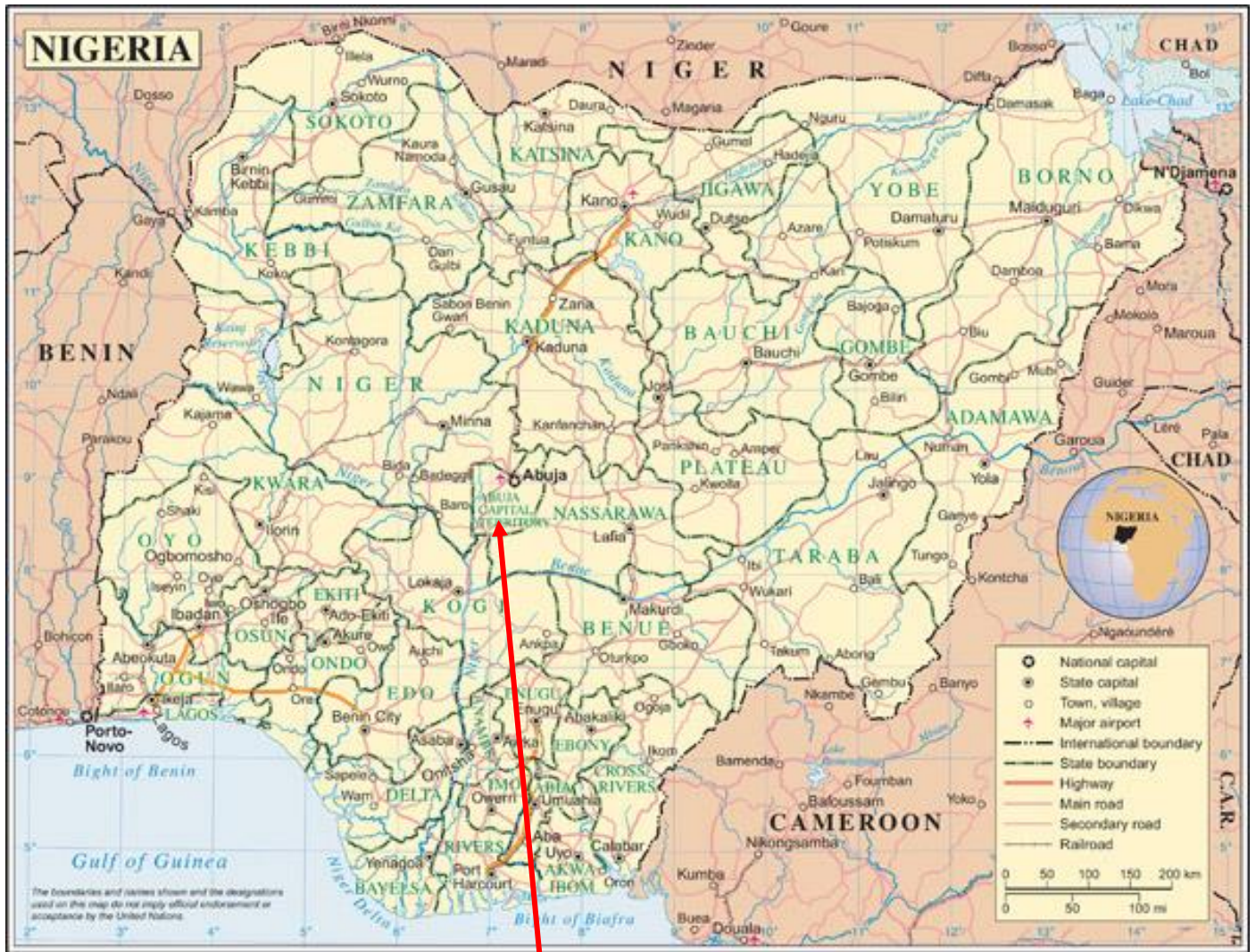
*October 2020*



**Plate 8: Proposed Project Site from the Eastern Axis**



**Figure 1: General Plot Plan of the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**

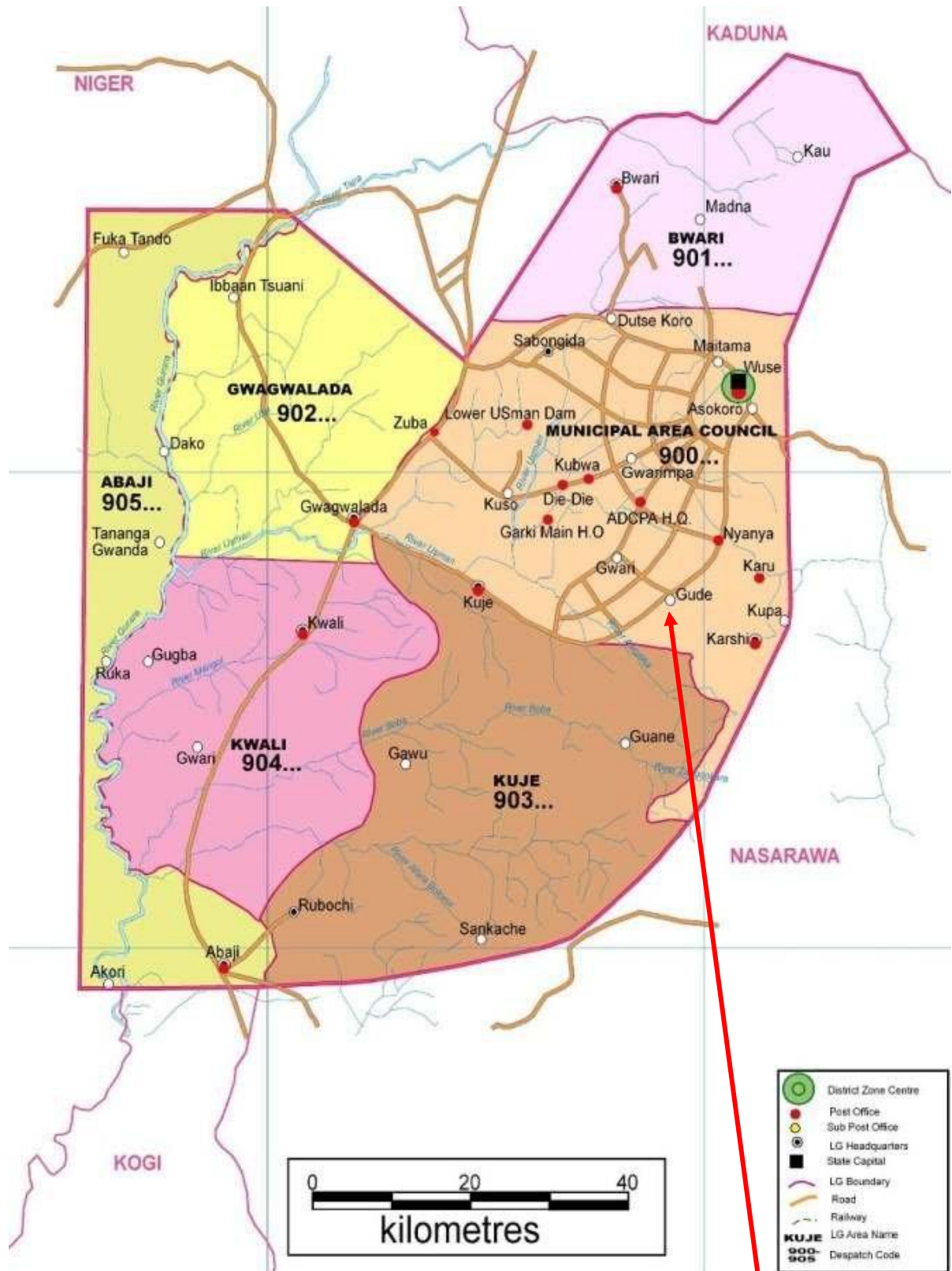


Source: <http://www.vidiani.com>

Figure 2: Political Map of Nigeria Showing Abuja, FCT

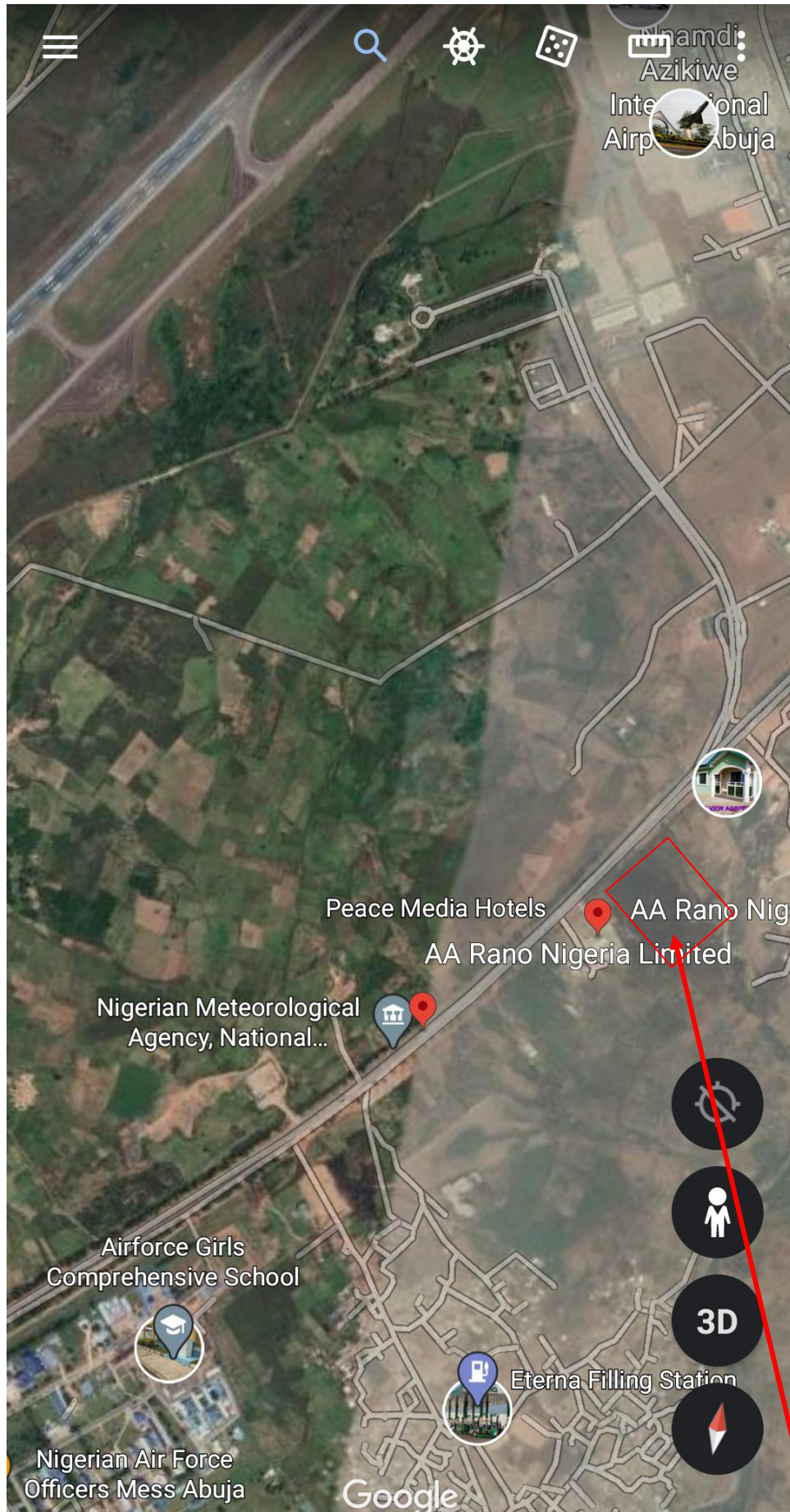






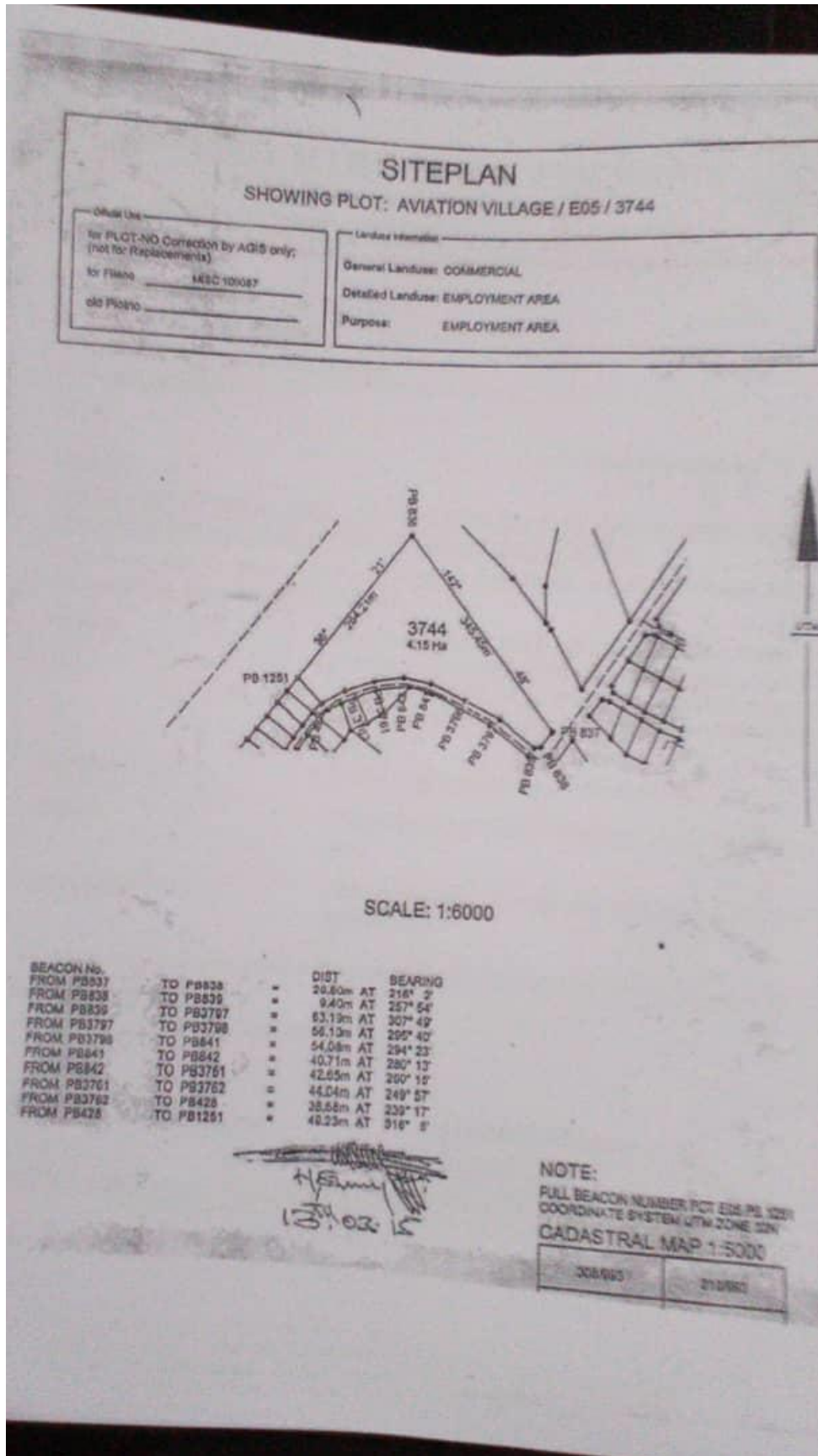
Source: [researchgate.net](https://www.researchgate.net)

Figure 3: Administrative Map of Abuja FCT showing the Abuja Municipal Area Council (AMAC)

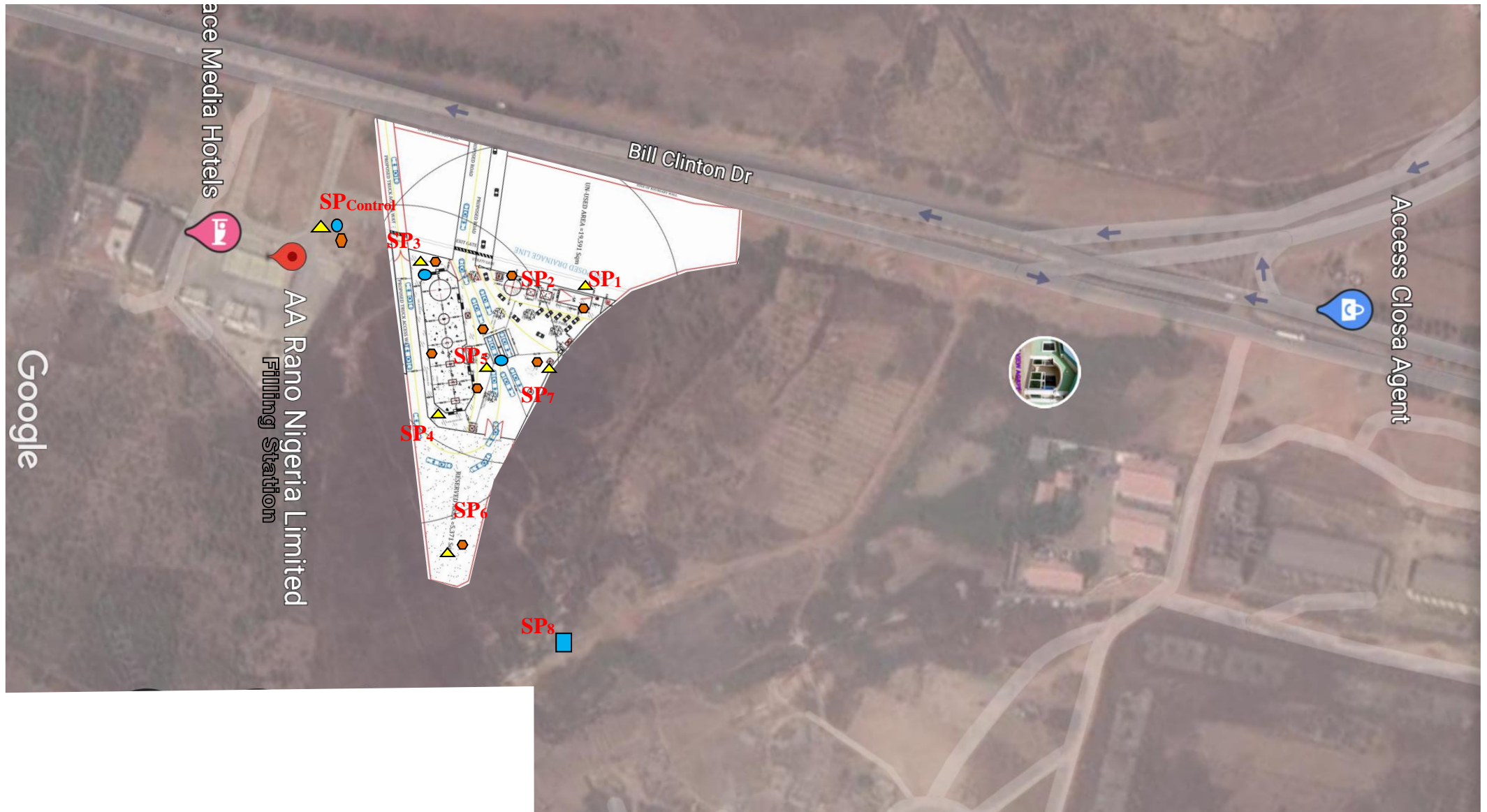


**Figure 4: Satellite Map of Aviation Village Area of Abuja Municipal Area Council Showing the Approximate Location of the Proposed A. A. Rano Nigeria**

**Limited's ATK Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



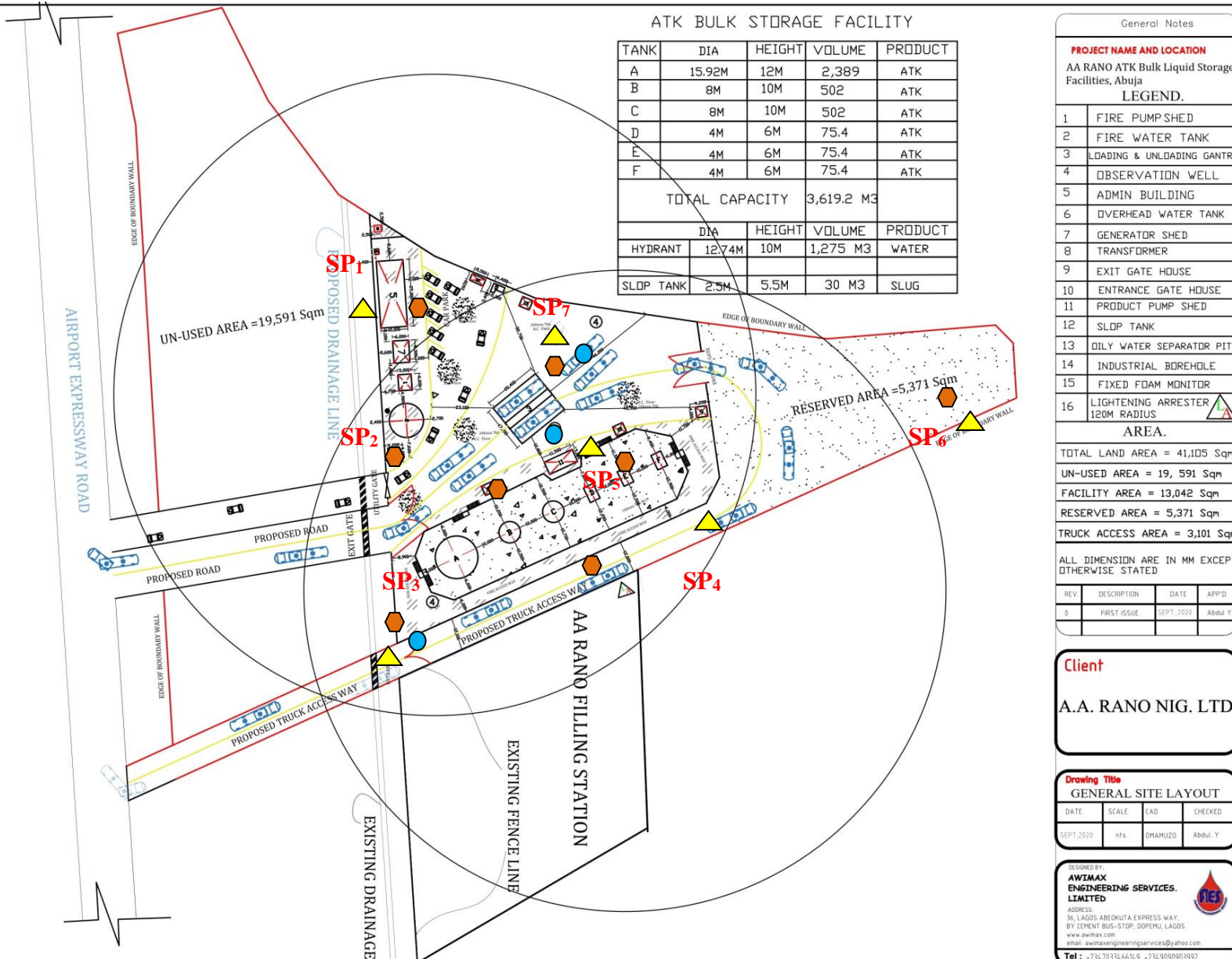
**Figure 5: Survey Map of the Proposed A. A. Rano Nigeria Limited's Tankfarm Site, along Nnamdi Azikiwe International Airport (Bill Clinton Dr), Abuja Municipal Area Council (AMAC), Abuja, FCT**



**Figure 6:** Satellite Map of Nnamdi Azikiwe International Airport Environs showing the Sampling Points (for Data Gathering Exercise) on and around the Proposed A. A. Rano Nigeria Limited's Depot Site, Bill Clinton Dr, Abuja Municipal Area Council (AMAC), Abuja, FCT

**LEGEND:**

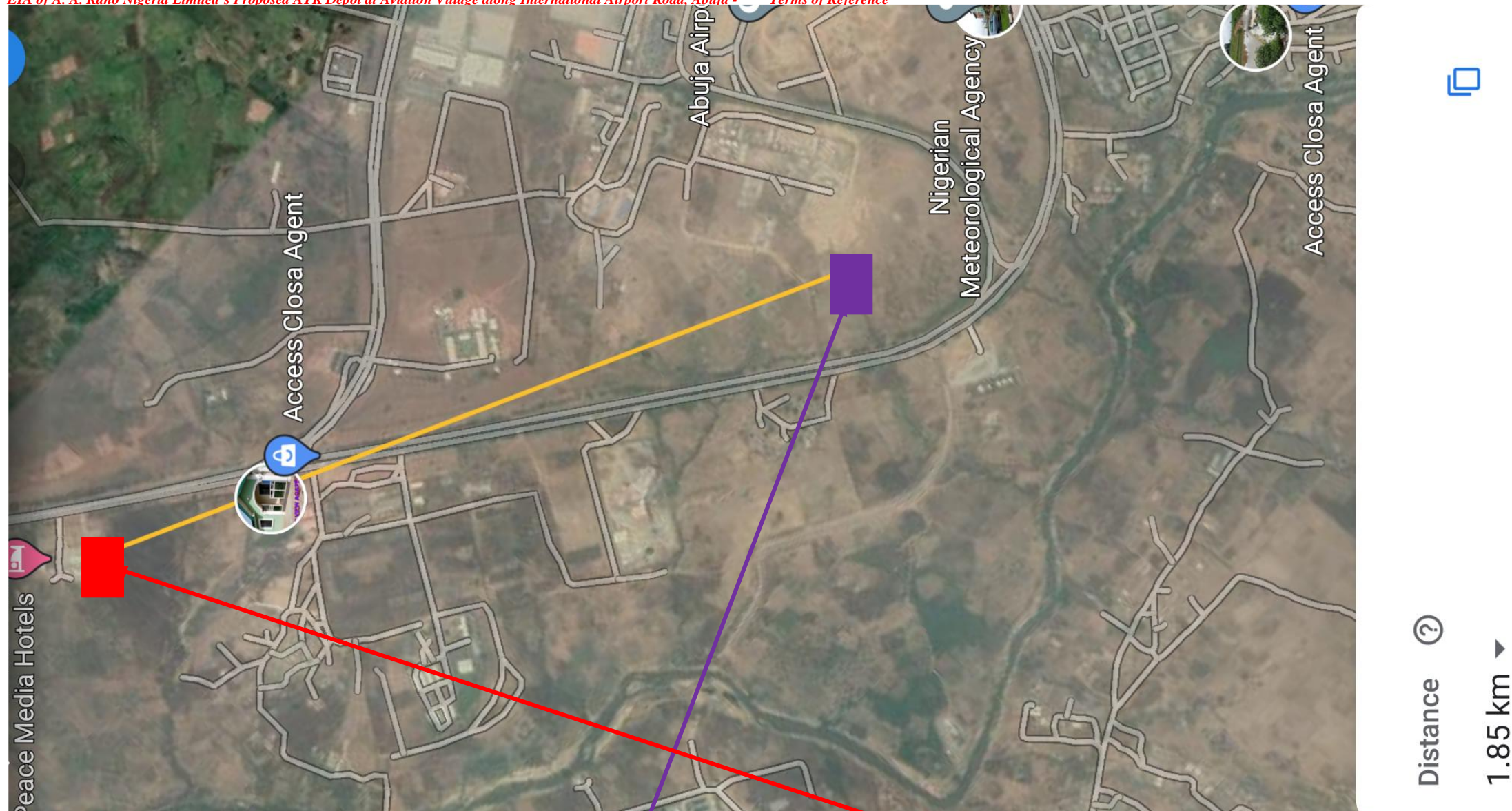
- ▲ Air and Noise
- Ground Water
- ⬢ Soil
- Surface Water
- SP<sub>1</sub> – SP<sub>8</sub> - Sampling Points 1 to 8



**Figure 7: Sampling Diagram (for Data Gathering Exercise) on the Proposed A. A. Rano Nigeria Limited's Depot Site, Bill Clinton Dr, Abuja Municipal Area Council (AMAC), Abuja, FCT**

**LEGEND:**

- ▲ Air and Noise
- Ground Water
- ◆ Soil
- Surface Water
- SP1 - SP7 - Sampling Points 1 to 7



**Figure 8:** Satellite Map of Nnamdi Azikiwe International Airport, Abuja and Environs with Red Arrow Pointing at the Proposed A. A. Rano Nigeria Limited's ATK Depot Site along Bill Clinton Dr (Nnamdi Azikiwe International Airport Road), Aviation Village, Abuja Municipal Area Council (AMAC), Abuja, FCT; and with Purple Arrow Pointing at the Everlink Telesat Network Limited's Four Star Hotel Site, along Nnamdi Azikiwe International Airport Road, Aviation Village, Abuja Municipal Area Council (AMAC), Abuja, FCT, About 1.85 km Apart

**TABLE 1: SAMPLING SCHEDULE (TABLE) FOR SAMPLING LOCATIONS SHOWN ON FIGURES 6 to 7**

ITEM NO.	SAMPLING POINTS	ENVIRONMENTAL ATTRIBUTES SAMPLED	SAMPLING POINTS COORDINATES: LATITUDE      LONGITUDE		TOTAL NUMBER OF SAMPLES (@ 1 SAMPLE / ENVIRONMENTAL ATTRIBUTE)	
<b>FOR SAMPLES TAKEN ON AND AROUND THE PROPOSED A. A. RANO NIGERIA LIMITED'S ATK DEPOT PROJECT SITE – OCTOBER 2020</b>						
1.	SP <sub>1</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'18.463"	E007° 16'16.619"	3	
2.	SP <sub>2</sub>	1.) Soil;	N08° 59'15.9"	E007° 16'14.9"	1	
3.	SP <sub>3</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (GW2); 3.) Soil;	N08° 59'14.391"	E007° 16'13.251"	4	
4.	SP <sub>4</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'12.746"	E007° 16'14.581"	3	
5.	SP <sub>5</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (GW1); 3.) Soil;	N08° 59'14.724"	E007° 16'16.554"	4	
6.	SP <sub>6</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'14.64"	E007° 16'17.591"	3	
7.	SP <sub>7</sub>	1.) Air Quality and Noise Level; 2.) Soil;	N08° 59'17.275"	E007° 16'18.048"	3	
8.	SP <sub>8</sub>	1.) Surface Water;	N08° 59'14.0"	E007° 16'21.7"	1	
9.	SP <sub>Control</sub>	1.) Air Quality and Noise Level; 2.) Ground Water (Existing Borehole); 3.) Soil;	N08° 59'14.0"	E007° 16'12.5"	4	
					<b>26 SAMPLES</b>	
<b>FOR SAMPLES TAKEN ON NEARBY FACILITY - EVERLINK TELESAT NETWORK LTD'S FOUR STAR HOTEL PROJECT SITE 1.85 KM AWAY - APRIL 2019</b>						
10.	A1	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'6.912"	E007° 16'39.144"	3	
11.	A2	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'10.152"	E007° 16'39.54"	3	
12.	A3	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'8.892"	E007° 16'38.892"	3	
13.	A4	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'7.776"	E007° 16'38.244"	3	
14.	A5	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'5.58"	E007° 16'37.236"	3	
15.	A6	1.) Air Quality; 2.) Noise Level; 3.) Soil;	N09° 0'4.968"	E007° 16'38.136"	3	
16.	A7	1.) Noise Level;	N09° 0'6.336"	E007° 16'37.596"	1	
17.	A8	1.) Noise Level;	N09° 0'3.78"	E007° 16'39.144"	1	
18.	A9	1.) Noise Level;	N09° 0'8.496"	E007° 16'39.0"	1	
19.	A10	1.) Noise Level;	N09° 0'9.144"	E007° 16'40.152"	1	
					<b>22 SAMPLES</b>	
<b>TOTAL</b>	<b>19 SAMPLING POINTS</b>	<b>4 MAIN ENVIRONMENTAL ATTRIBUTES</b>			<b>48 SAMPLES</b>	

## **APPENDIX B**

**Proposed A. A. Rano ATK Depot, Aviation Village, Abuja - Geotechnical  
Subsoil Investigation Report November 2020**

----- Pages 1-64



# **A. A. RANO NIGERIA LIMITED**

## **PROPOSED ATK STORAGE DEPOT**

**AT AVIATION VILLAGE  
FCT, ABUJA.**

***SUBSOIL INVESTIGATION REPORT***

**NOVEMBER 2020**

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# **PROPOSED A. A. RANO ATK BULK LIQUID STORAGE FACILITIES AT, FCT - ABUJA**

## **REPORT OF SUBSOIL INVESTIGATION**

### **1.0 INTRODUCTION**

A new ATK Bulk Liquid storage facilities is proposed for construction within the Aviation Village, FCT - Abuja

The client, **A. A. RANO NIGERIA LIMITED** through their consultants, **BORKY S. G. BAKRE AND ASSOCIATES LTD** commissioned **IWP&GES, A DIVISION OF ABI-RHODES VENTURES** in association with **ASSOCIATED DRILLING AND GEOTECHNICS LIMITED** to carry out a subsoil investigation work within the project area. The subsoil investigation was designed according to BS 5930:1981 to determine the general stratigraphic sequence of the subsoil within the area, obtain their relevant engineering parameters and use this as a guide/aid to recommend safe and economical foundation types for supporting the structures (product tank, fire water tank and buildings etc.) proposed for construction on the site.

## **2.0 SITE DESCRIPTION**

The project area about 21,514sqm comprising facility area, reserved area, and truck access area is within a larger 41,105sqm extensive virgin piece of land located within the Aviation village along Airport Road. Federal Capital Territory, Abuja. The site is close to the Nnamdi Azikiwe International Airport.

Access to the site is mainly through the already mentioned Airport Road.

Surface configuration on the site is relatively flat but slopes towards the North East.

At the time of this investigation, vegetation on the site consists of sparse freshly sprouting shrubs, weeds and grasses.

### **2.1. Geology**

Geologically, the site lies generally within the Pre-Cambrian to Upper Cambrian Basement Complex of North Central Nigeria characterized by Undifferentiated Gneiss-Migmatite.

### 3.0 DESCRIPTION OF WORK

The investigation involved field and laboratory works as well as analysis of test results and compilation of geotechnical report of findings. The field and laboratory work are further discussed below.

#### 3.1 Fieldwork

Fieldwork commenced on Monday September 21<sup>st</sup> 2020 and was completed on Thursday October 1<sup>st</sup> 2020. The field work consisted of drilling a total of 6Nos. geotechnical boreholes (However BH1-BH3 were analysed), carrying out a total of 10Nos. Cone penetrometer test. (PT1-PT10), 3Nos. Trial pits and survey location of each test point based on the site plan provided by the client. **The tests were distributed within the site to give a fair representation of the subsoil condition directly underlying the areas proposed for the new developments (see site layout attached).**

The penetrometer test was carried out using a 10 tons testing equipment. The tests were terminated, when the equipment anchorage yielded.

The following represents the depth of termination of each of the penetrometer test:

Test Point	Depth Terminated (M)
PT1	-2.40
PT2	-2.20
PT3	-3.00
PT4	-2.00
PT5	-1.60
PT6	-2.20
PT7	-5.60
PT8	-6.60
PT9	-3.60
PT10	-2.40

The boreholes were advanced using the light cable percussion (shell and auger) technique with a fully motorized Dando 150 exploratory rig. The boreholes were terminated at between **-3.00m to -15.00m depths on encountering very hard mixed lateritic material or weathered/fresh rock material. (See attached logs for details of individual termination depths).**

Sampling and in-situ test were carried out progressively with the advancement of the boreholes through the overburden sediments.

- Disturbed samples were taken within the sediments at regular intervals and at change of every stratum as deemed necessary. Material from the split spoon sampler used in the standard penetration test (SPT) was also taken as disturbed samples
- Standard penetration test (SPTs) were carried out in the granular soil at 1.5m to 3.0m intervals. A 50mm diameter split spoon sampler is driven 450mm into the soil using a 65kg hammer with a height of 760mm. The number of blow N-values required to obtain 300mm penetration through any disturbed ground at the bottom of the borehole is then recorded.
- Undisturbed samples were taken in the cohesive material by driving a 100mm diameter sampler through a total of 450mm. These were taken at regular intervals.
- The trial pits were carried out by manual excavation and measured 1m X 1m X 2.0m in dimension.

### 3.2 Laboratory Test

Laboratory test were carried out in accordance and compliance with the specification contained in BS 1377: methods of test for soil for Civil Engineering purposes and ASTM Standard.

The tests conducted include:

1. **Soil Classification:** this includes the determination of the natural moisture content, Atterberg limits, the particle size distribution and hydrometer analysis.
2. **Soil Strength Test:** This essentially involved the determination of the relevant strength parameters through the quick undrained triaxial compression test and the one dimensional consolidation test on undisturbed cohesive material. Optimum moisture content (OMC), Maximum dry density (MDR) and CBR values were also determined.

The results of the field and laboratory test are presented in data and graphical forms in the Appendix of this report.

#### 4.0 SUBSOIL AND GROUNDWATER CONDITIONS

Details of the subsoil and groundwater conditions as observed from the boreholes, trial pits and Cpts logs are further discussed below:

##### 4.1 Subsoil Condition

**Mainly lateritic soil with intermix of cohesive and granular material was encountered on this site within the test area and depth investigated.** The material encountered also generally includes decompose (weathered quartzite)/sandy intercalation with some mica and rock fragments.

The subsoil condition on the site is fairly uniform. **There are however some variations in soil consistency and layer thickness/boundaries at the different tests points. Detailed subsoil profiles are as in the attached logs.**

Nevertheless, a concise general description of the subsoil profile established from the tests carried out is given below.

From the existing ground surface to about -0.25m depth is a layer of generally loose dark to light brown silty fine medium **Sand** with plant roots (topsoil). Cone qc end resistance values for this layer ranges from 3 to 30kg/cm<sup>2</sup>.

From about 0.75m to about -2.25m/-3.00m depth is a layer of medium dense to becoming dense/firm to stiff brown lateritic silty clayey **Sand/sandy Clay**. Cone qc end resistance values for this layer ranges from 1 to 320kg/cm<sup>2</sup>. SPT N-values for this material range from 23 to 29.

From about -2.25m/-3.00m to about -5.25/6.00m depth is made up of medium dense/stiff brown to reddish brown and yellow lateritic gravelly coarse **Sand/silty sandy Clay** with rock fragments in the area of BH3 terminating at -3.00m depth. Within this layer in the area of BH2 is a band of lateritic medium coarse gravel Sand.at between -3.00m to -3.75m depth. Cone qc end resistance values for this layer ranges from 33 to 300kg/cm<sup>2</sup>. SPT N-values for this material range from 20 to 25.

Cohesion values for this material taken at -4.5m depth in BH2 is 95KN/m<sup>2</sup> while the angle of internal friction 15.

From -5.25m/-6.00 to the depth of termination of the furthest borehole test at -15.00m depth consists of medium dense/stiff to very stiff greyish to light brown mostly decompose medium coarse Sand with mica/silty sandy Clay with mica and decompose silty clayey sand/sandy clay. In BH1, this layer terminates in fresh rock at -9.75m depth. SPT N-values for this material range from 14 to 22.

Note, the penetrometer test indicates that in place within the site are areas of very loose/soft layer at the upper -1.50m depth.

#### **4.2 Groundwater Condition**

**Groundwater was generally encountered across/within the site and depth investigated at about -1.00m to -4.00m depth. Note the variation in the ground water levels across the site. Seasonal variation on the groundwater level is also expected.**



## 5.0 FOUNDATION DISCUSSION AND RECOMMENDATION

### 5.1 Design Details

We were reliably advised that this subsoil investigation is to aid the foundation design for the following structures planned for construction for this proposed depot:

- An Admin building.
- 6Nos ATK products storage tanks and its support facilities.
- A fire water tank (FWT) (Hydrant)

Though the anticipated structural loading at foundation level has not been provided for the various proposed structures, we have nevertheless made some structural loading derivations based on the configurations of the structures to be built on the site as contained in the site plan/drawings provided.

For the proposed office building, assuming an average floor loading of 10-15KN/m<sup>2</sup> and 7KN/m<sup>2</sup> for the roof, a ground plus one floors structure will impose foundation pressures in the order of 27-37 KN/m<sup>2</sup>.

The largest of the ATK product tank is expected to store Two Thousand Three Hundred and Eighty Nine cubic metres (2.389m<sup>3</sup>) of aviation fuel while the Fire Water Tank (FWT) is expected to store One Thousand Two Hundred and Seventy Five cubic metres (1,275m<sup>3</sup>) of water. This is an equivalent weight of about 19,709.25Kn for the largest ATK tank and 12,750kN for the FWT (Hydrant). Presume the tanks seating on a 750mm concrete slab of 15.92m and 12.74m diameters respectively for the ATK tank and the FWT (considering one meter circular walkway round the tank edges) and also assume 10% of the stored product weight as the self-weight of the tanks. This gives us a gross compressive loading of about 20,114.084Kn (24,294.78kN considered for design in view of critical loading scenario which is during hydro test) over an area of 224.88m<sup>2</sup> for the largest ATK tank and 13,105kN over an area of 148.293m<sup>2</sup> for the FWT. Thus the tanks will impose equivalent foundation pressure of 121KN/m<sup>2</sup> and 97.22KN/m<sup>2</sup> respectively for the largest ATK tank and FWT.

Our comments and recommendations as contained in this report are based on the above and careful analysis of results of the in-situ and laboratory test carried out.

## 5.2 Shallow Foundation

The result of this test proved that below -0.25m depth, the materials encountered are generally or mostly medium dense/stiff lateritic Sands/silty clayey Sands/sandy Clay with gravels and decompose rock and mica in places. Also the consistency of these materials tend to increase with increasing depth and possesses good engineering properties with low compressibility potential, moderate to high shear strength and can support moderate to heavy loadings with increasing depth.

**Conventional near surface (shallow) foundation can thus be adopted on this site and is recommended for the proposed development.**

**Foundation depth of between –1.50m to –2.00m is recommended.**

**For guidance purposes only, the allowable safe bearing capacities estimated for the natural foundation within the recommended depth range above is 162KN/m<sup>2</sup> and can be adopted irrespective of the foundation width. However for the critical structures proposed for construction on this site, the use of raft foundation is particularly expedient so as to eliminate the possibility of differential settlement.**

Settlement is expected not to exceed 25mm for strip and isolated footings and 50mm for raft for the allowable bearing capacities stated above.

### 5.2.1 Pavement Design

It is expected that pavement for access roads and parking lots would be provided within this development. Such pavement could be finished in paving concrete slabs and or asphalted concrete.

The design of pavement thickness is governed by 3 main factors:

- (i) The bearing capacity of the sub grade usually expressed in terms of California bearing ratio (CBR).
- (ii) The intensity and character of traffic.
- (iii) Economic Factors.

From the test conducted, the natural Sub-grade material of the proposed access roads and parking lot have been assessed in order to assist in the design of access roads and other flexible or hard standing pavements that may be required at the site.

In the analysis, the tested layer (lateritic silty clayey sand) were proved as Sub grade with generally low moisture content.

The values of the California Bearing Ratio (CBR) for the representative test done and the sectioned layers are given in the attachments to this report. Also presented are the generated graphs from the test done.

**In all the values of the California Bearing Ratio (CBR) are generally moderate for Sub grade material and the site is suitable for the construction of access road, and other pavements that may be required at the site.**

### **5.3 General Precaution for Shallow Foundation Construction**

It is recommended that the following general guidelines that govern the construction of shallow foundations should be observed when work starts on the site:

- Over excavation beyond the depth stated should not be done.
- Ingress of water into the excavated foundation trench should be prevented, if the stated bearing value at the founding depth is to be achieved. A layer of concrete blinding should therefore be provided within a trench once it has been excavated.
- Adequate cover to the concrete should be allowed for the reinforcement bars to protect them from possible effect of corrosion
- The sides of foundation should be backfilled as soon as they are cast

## **6.0 MISCELLANEOUS**

### **6.1 Site Preparation**

While no special site preparation is required, it is however expected that foundation trenches will be dug. We therefore advice that excavation works be carried out in such a way as to avoid haphazard excavations.

Thereafter, restoration program including controlled compaction with suitable backfill material in excavated trenches particularly the areas earmarked for the proposed buildings should be carried out.

Provision for adequate drainage along with other design measures should also be made to control possible run off water on this site.

## 7.0 CONCLUSION

We strongly recommend that the design and construction of all foundation and earthwork be carried out in accordance with good engineering practice such as specified in the British Standard Institution, CP 2004:1973 Code of Practice for foundation and BS.6031: 1981: Code of practice for earthworks.

We trust you shall find the contents of this report useful. We shall be at your disposal for any other clarification that you may require.

Yours faithfully,  
For: **ADG LTD**

Frank Ikuewan.

**A. A. RANO NIG. LTD**

**PROPOSED ATK STORAGE DEPOT  
SOIL TEST LABORATORY RESULT & ANALYSIS**

**AT AVIATION VILLAGE,  
FCT, ABUJA.**

**NOVEMBER, 2020.**

# ATTACHMENTS

*[Handwritten signature]*  
2/11/20

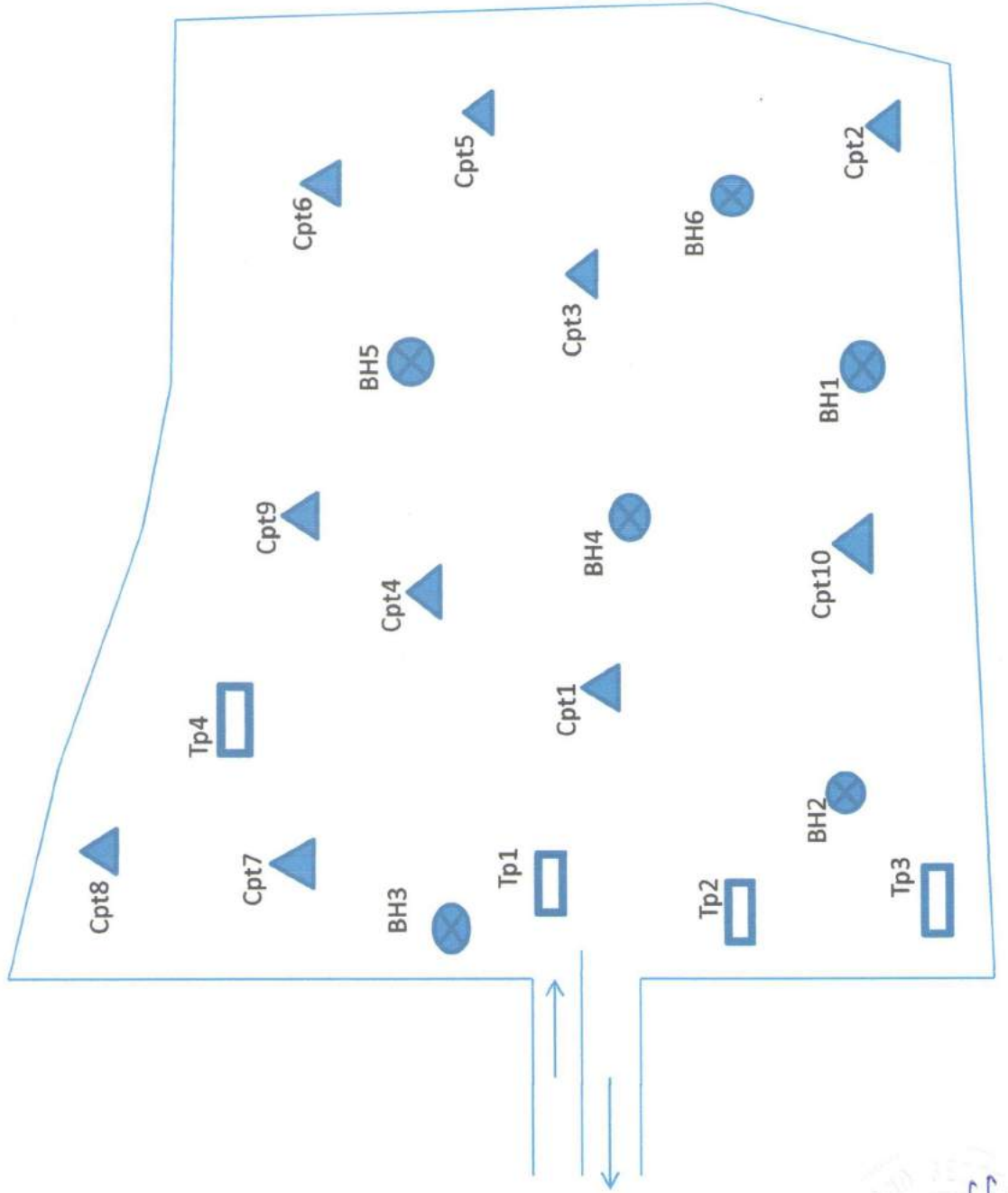
**Appendix A**  
Site Layout

A handwritten signature in blue ink is written over a faint circular stamp. The signature is stylized and appears to be 'S. H. ...'. The stamp is mostly illegible but seems to contain some text around the perimeter.



# SITE LAYOUT OF INVESTIGATION

Proposed A.A Rano A.T.K Bulk Liquid Storage Facilities ,Abuja.



## Legend

	Cone test
	Borehole
	Trial pit



# Appendix B

Borehole/Trial Pit Logs

A handwritten signature in blue ink, appearing to be 'S. J. [unclear]', with the date '2/21/20' written below it.

PROJECT: Proposed A.A RANO ATK STORAGE		BOREHOLE LOG				Boring No: 1							
LOCATION: ABUJA		FCT				SHEET: 1 of 1							
		Water Level: 1.50m				Date: NOVEMBER, 2020							
DEPTH (M)	SAMPLES # Undisturbed (S.P.T) 0 Disturbed (S.P.T.)	S.P.T.										SOIL DESCRIPTIONS	
		Blows per 300mm.											
		10	20	30	40	50	60	70	80	90	100		
													Loose dark brown silty fine medium Sand with plant roots(Topsoil) -0.25m
1	0												Firm to stiff brown lateritic silty sandy Clay -3.00m
2	0												
3	0												
4	0												Medium dense brown lateritic gravelly coarse Sand -5.25m
5	0												
6	0												
7	0												Medium dark/very stiff light brown to greyish silty sandy Clay with mica/decompose silty clayey sand/sandy clay with mica terminating in fresh rock particles -9.75m
8	0												
9	0												
10	0												EOB
11	0												
12	0												
13	0												
14	0												
15	0												



PROJECT: Proposed A.A RANO ATK STORAGE		BOREHOLE LOG				Boring No: 2						
LOCATION: ABUJA		FCT				SHEET: 1 of 1						
DEPTH (M)	SAMPLES ≠ Undisturbed (S.P.T) 0 Disturbed (S.P.T.)	Water Level: 1.0m				Date: NOVEMBER, 2020						
		S.P.T.				SOIL DESCRIPTIONS						
		Blows per 300mm.										
		10	20	30	40	50	60	70	80	90	100	
1	0											Loose dark brown silty fine medium Sand with plant roots (Topsoil) -0.25m
2	0			Δ29								medium dense brown lateritic silty clayey Sand -3.00m
3	0											Medium dense brown lateritic medium coarse gravel Sand -3.75m
4	0											Stiff reddish brown, yellow lateritic silty sandy clay -6.0m
5	0											
6	0			'Δ25								
7	0											Medium dense/stiff greyish to light brown mostly decompose medium coarse Sand with mica and silty clay/clayey sand with mica at the top
8	0			Δ22								
9	0											
10	0											
11	0			Δ16								
12	0											
13	0			Δ19								
14	0											
15	0			Δ2								-15m

EOB

Handwritten signature and circular stamp of the Surveyor General's Office, Abuja.

PROJECT: Proposed A.A RANO ATK STORAGE		BOREHOLE LOG				Boring No: 3	
LOCATION: ABUJA		FCT				SHEET: 1 of 1	
DEPTH (M)		Water Level: 3.0m				Date: NOVEMBER, 2020	
SAMPLES		S.P.T.				SOIL DESCRIPTIONS	
≠ Undisturbed (S.P.T)		Blows per 300mm.					
0 Disturbed (S.P.T.)		10 20 30 40 50 60 70 80 90 100					
	0					Loose light brown silty fine medium Sand with plant roots (Topsoil)	-0.25m
1						Stiff brown lateritic silty sandy Clay	
2	0						-2.25m
3	0					Rock fragments	-3.00m
							EOB
4	0						
5	0						
6	0						
7	0						
8	0						
9	0						
10	0						
11	0						
12	0						
13	0						
14	0						
15							-15.0m

Handwritten signature: *[Signature]*  
Circular stamp: SURVEYING AND MAPPING DEPARTMENT, ABUJA

<b>PROJECT:</b> Proposed ATK Bulk storage facilities		<b>TRIAL PIT LOG</b>				<b>T.P No.:</b> 1	1						
<b>LOCATION:</b> FCT ABUJA						<b>Sheet No.:</b> 1 of 1							
DEPTH IN METERS	SAMPLES	WATER TABLE DEPTH (mt): 1.0						Date: Nov 2020					
		<b>S . P . T .</b>											
		Blows for 300mm											
	# Undisturbed	0	10	20	30	40	50	60	70	80	90	100	<b>SOIL DESCRIPTION</b>
	0 Disturbed (S.P.T.)												
0													Brown lateritic silty clayey Sand
0													
2													



8

PROJECT: Proposed ATK Bulk storage facilities		TRIAL PIT LOG										T.P No.: 2	1	
LOCATION: FCT ABUJA												Sheet No.: 1 of 1		
DEPTH IN METERS	SAMPLES	WATER TABLE DEPTH (mt): 1.0										Date: Nov 2020		
		S.P.T.										SOIL DESCRIPTION		
# Undisturbed		Blows for 300mm												
0 Disturbed (S.P.T.)		0	10	20	30	40	50	60	70	80	90	100		
0													Brown silty fine medium Sand	
1													Brown lateritic silty clayey Sand	
2														

A handwritten signature in blue ink is written over a circular professional stamp. The stamp contains text around its perimeter, including 'PROFESSIONAL ENGINEER' and 'REGISTERED', but it is mostly illegible due to the signature and fading.

PROJECT: Proposed ATK Bulk storage facilities		TRIAL PIT LOG										T.P No.: 3	1
LOCATION: FCT ABUJA												Sheet No.: 1 of 1	
DEPTH IN METERS	SAMPLES	WATER TABLE DEPTH (mt): 1.0										Date: Nov 2020	
		<b>S . P . T .</b>										<b>SOIL DESCRIPTION</b>	
		Blows for 300mm											
	# Undisturbed	0 10 20 30 40 50 60 70 80 90 100											
	0 Disturbed (S.P.T.)												
	0											Brown lateritic silty clayey Sand	
	0												


  
 10



# Appendix C

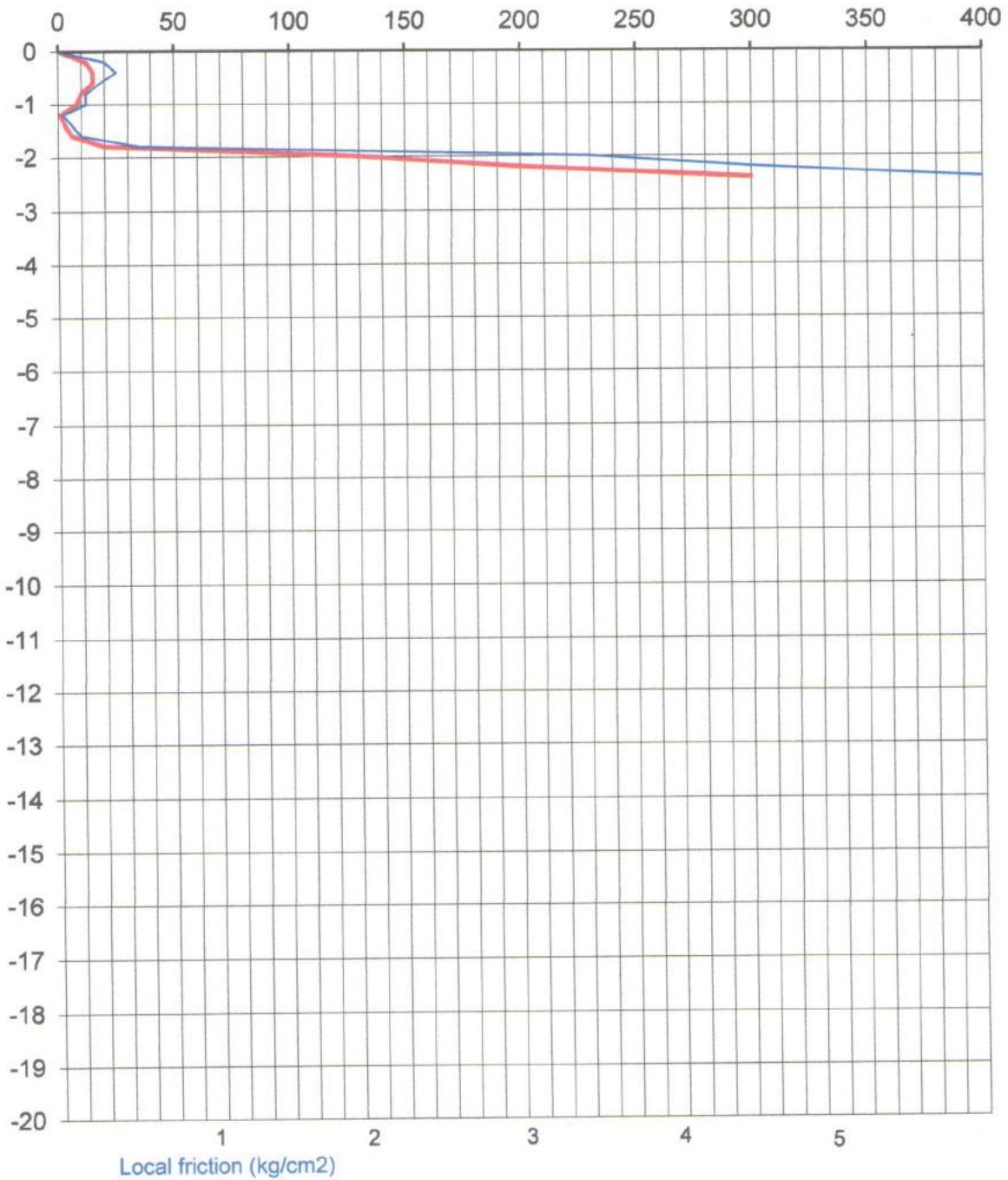
CPT Logs

A circular stamp with a signature written over it. The signature is in blue ink and appears to be "S. H. H. H.". The stamp is partially obscured by the signature.

//

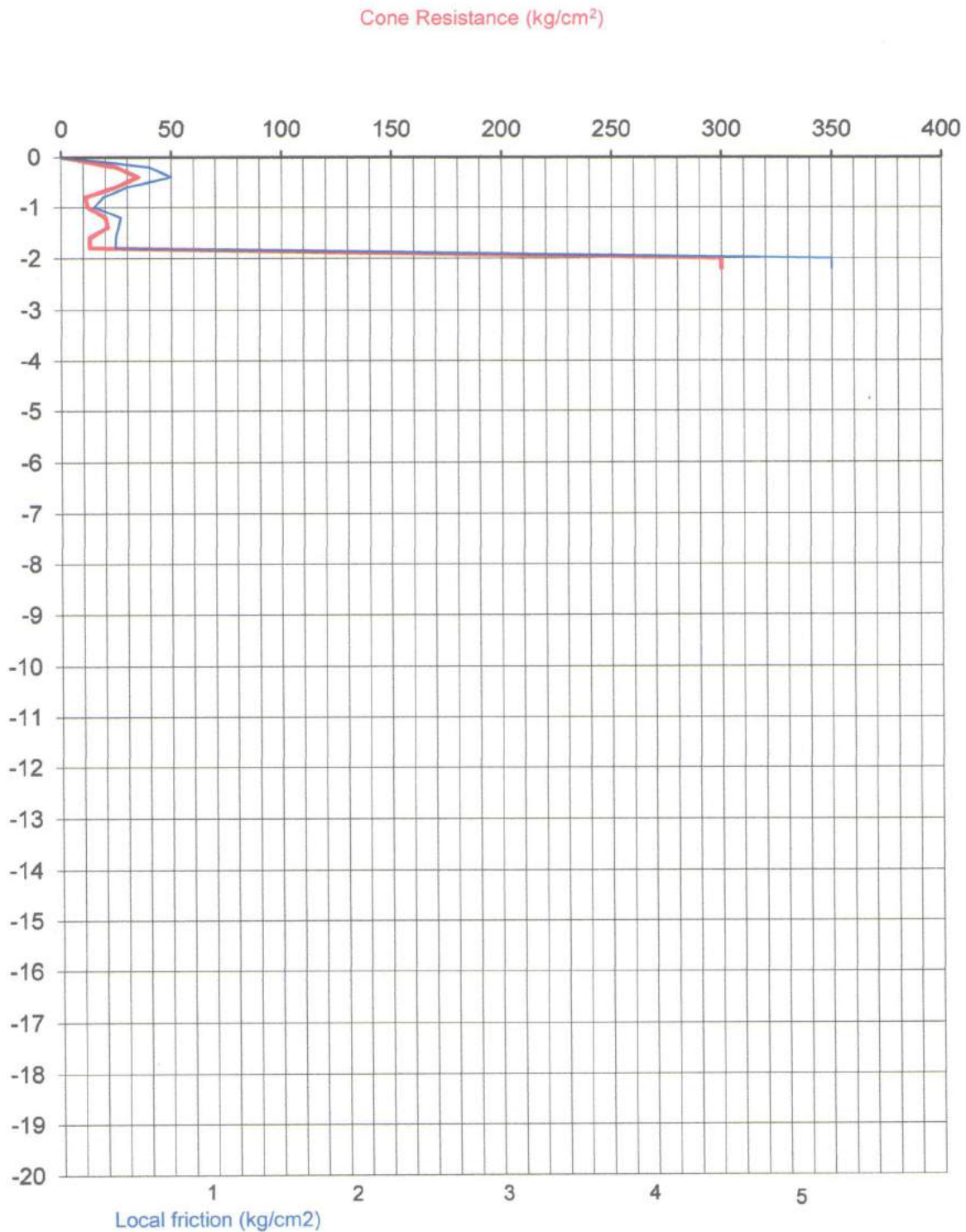
**(Dutch Cone Penetrometer Test)**

Cone Resistance (kg/cm<sup>2</sup>)



Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	Test No.:	1
Job No:	1242	Machine:	10 Ton
CLIENT:	A.A RANO NIGERIA LIMITED.	Cone Type:	CF
GWL:		DATE:	27-09-20
REMARK	STOP AT 2.40m	TIME:	

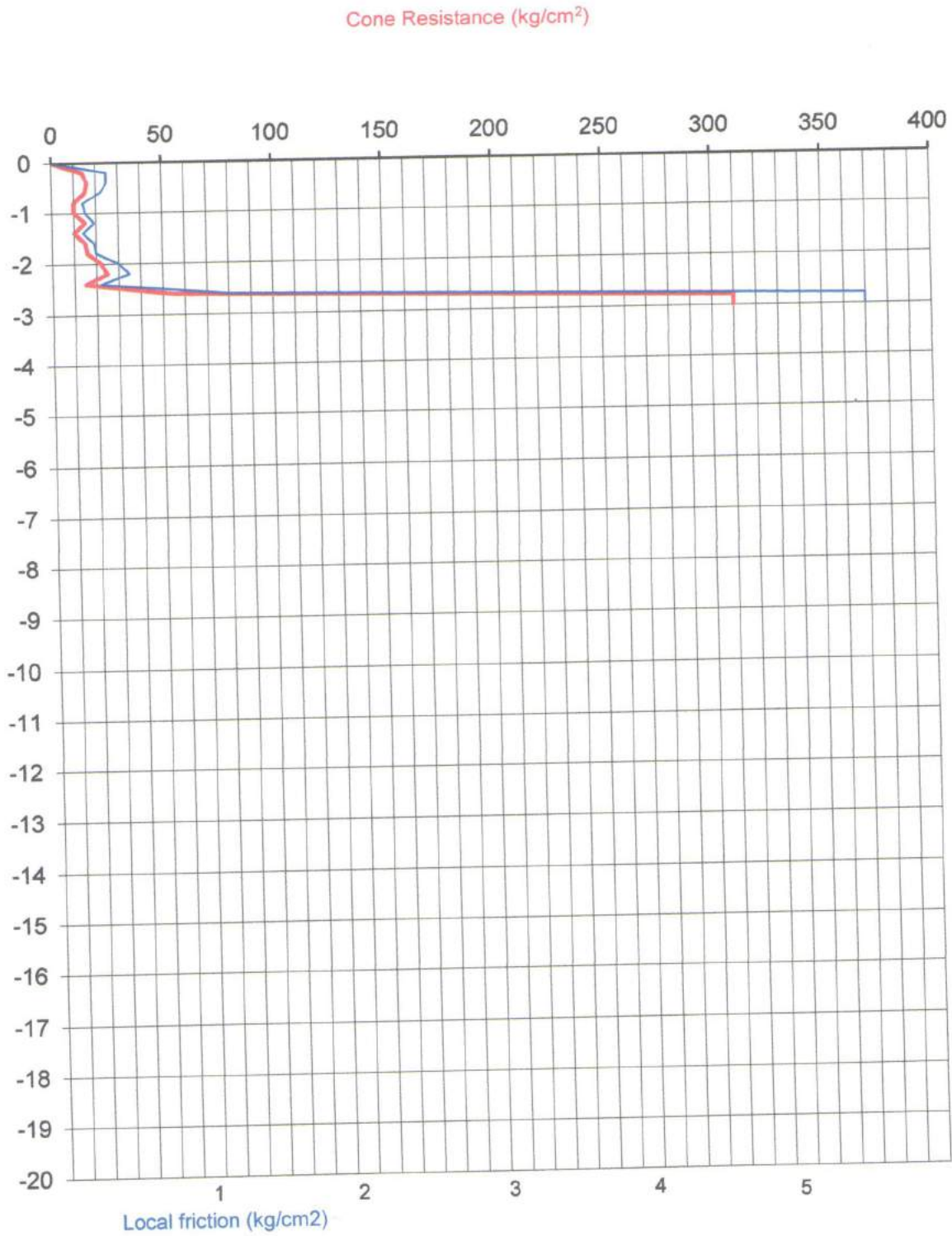
**(Dutch Cone Penetrometer Test)**



<b>Location:</b>	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	<b>Test No.:</b>	2
<b>Job No:</b>	1242	<b>Machine:</b>	10 Ton
<b>CLIENT:</b>	A.A RANO NIGERIA LIMITED.	<b>Cone Type:</b>	CF
<b>GWL:</b>		<b>DATE:</b>	27-09-20
<b>REMARK</b>	STOP AT 2.20m	<b>TIME:</b>	

*[Handwritten signature]*

(Dutch Cone Penetrometer Test)

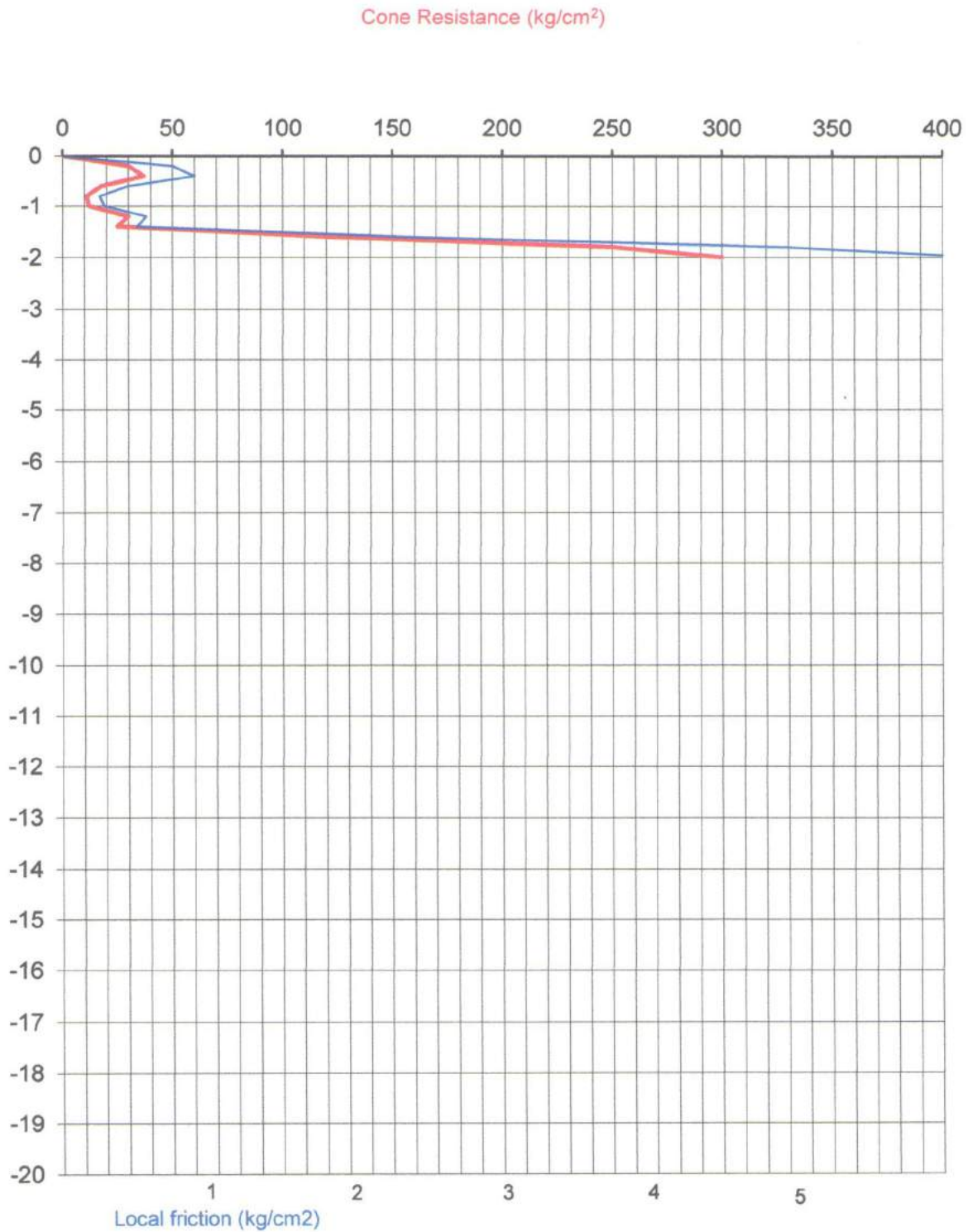


Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.
Job No:	1242
CLIENT:	A.A RANO NIGERIA LIMITED.
GWL:	
REMARK	STOP AT 3.00m

Test No.:	3
Machine:	10 Ton
Cone Type:	CF
DATE:	28-09-20
TIME:	

*[Handwritten signature]*

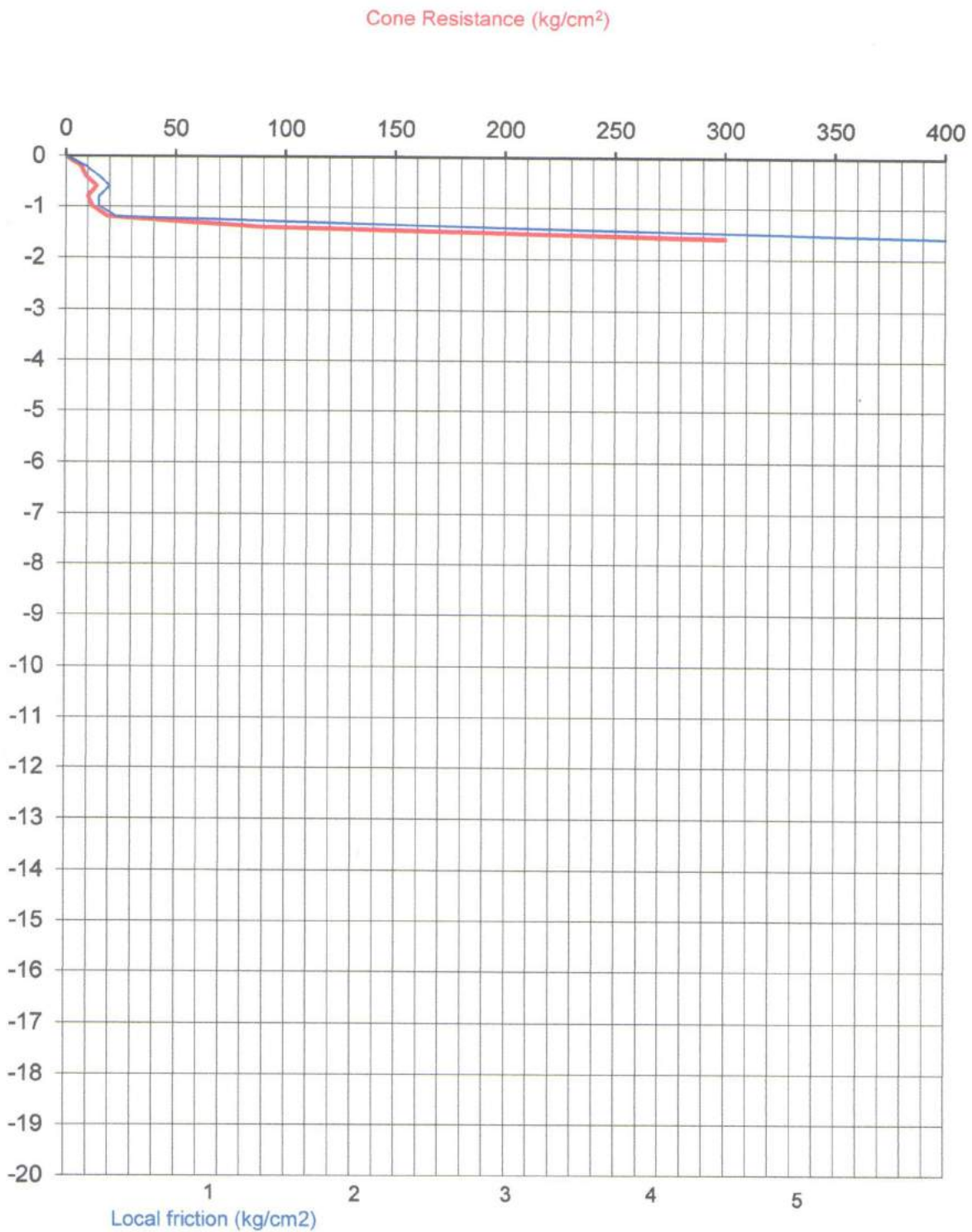
### (Dutch Cone Penetrometer Test)



Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	Test No.:	4
Job No:	1242	Machine:	10 Ton
CLIENT:	A.A RANO NIGERIA LIMITED.	Cone Type:	CF
GWL:		DATE:	28-09-20
REMARK	STOP AT 2.00m	TIME:	

*[Handwritten signature]*

### (Dutch Cone Penetrometer Test)



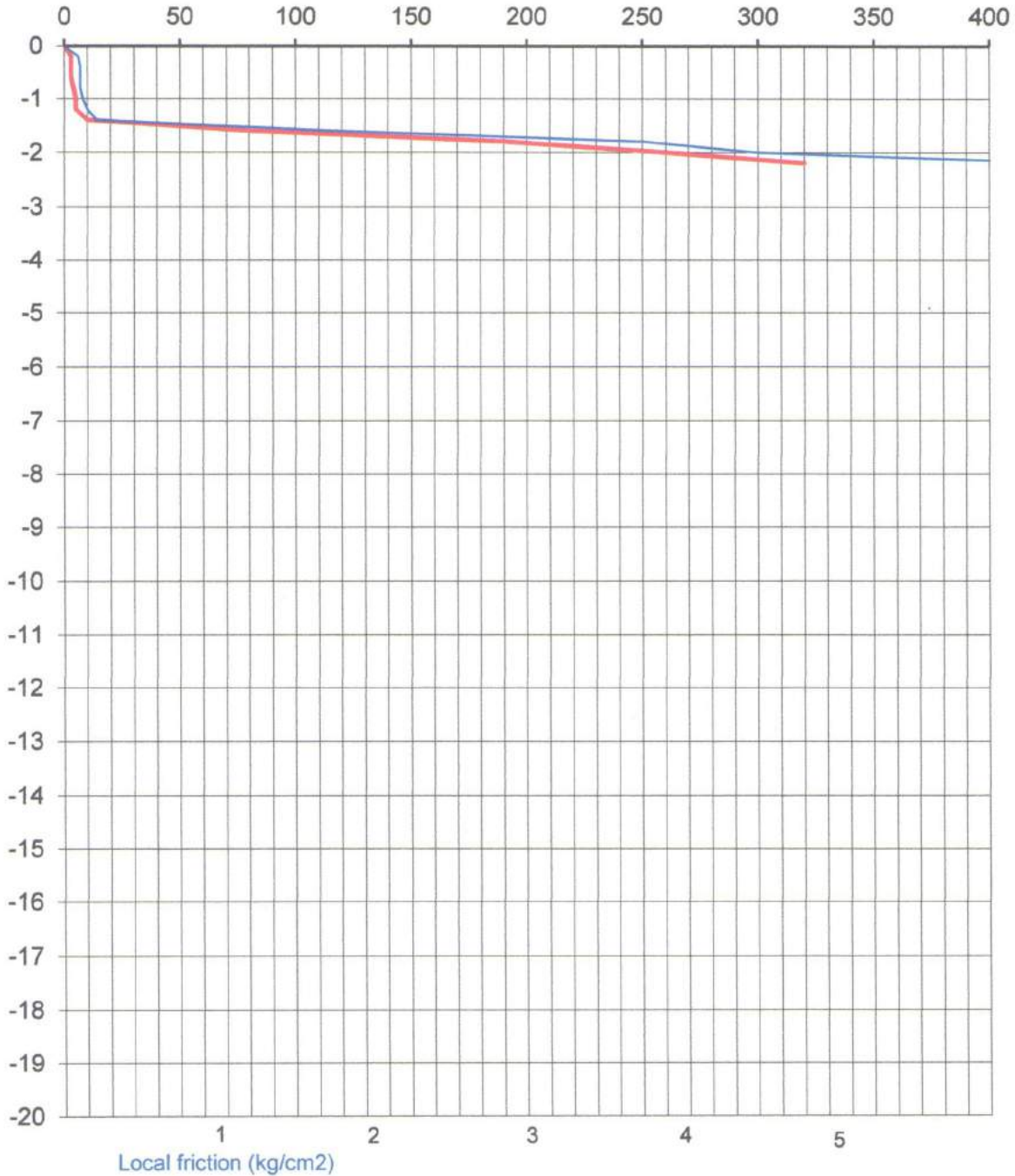
Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.
Job No:	1242
CLIENT:	A.A RANO NIGERIA LIMITED.
GWL:	
REMARK	STOP AT 1.60m

Test No.:	5
Machine:	10 Ton
Cone Type:	CF
DATE:	28-09-20
TIME:	

*[Handwritten signature]*  
28/9/20  
16

### (Dutch Cone Penetrometer Test)

Cone Resistance (kg/cm<sup>2</sup>)

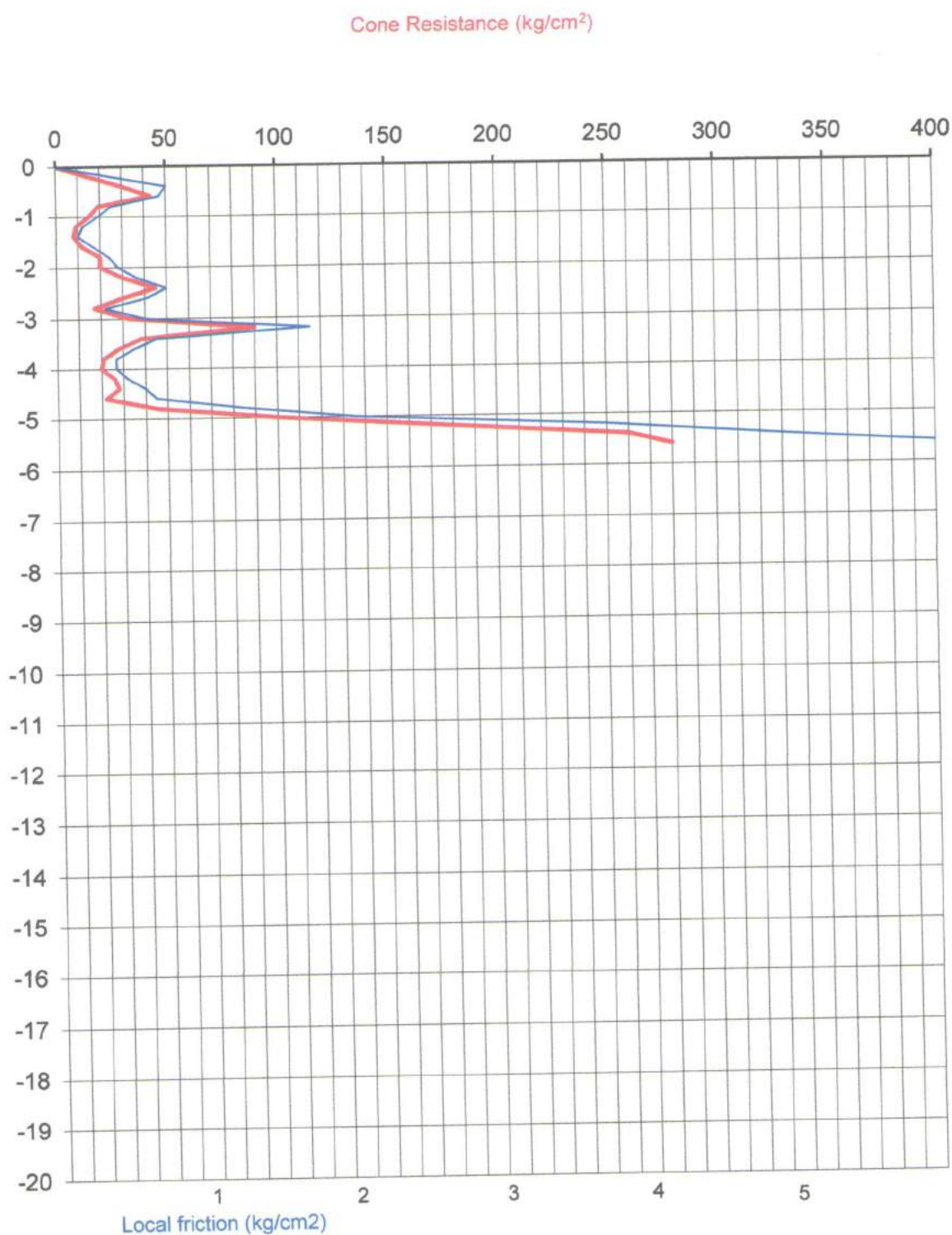


Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.
Job No:	1242
CLIENT:	A.A RANO NIGERIA LIMITED.
GWL:	
REMARK	STOP AT 2.20m

Test No.:	6
Machine:	10 Ton
Cone Type:	CF
DATE:	28-09-20
TIME:	

*[Handwritten signature]*  
28/9/20

### (Dutch Cone Penetrometer Test)



Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.
Job No:	1242
CLIENT:	A.A RANO NIGERIA LIMITED.
GWL:	3.20m
REMARK	STOP AT 5.60m

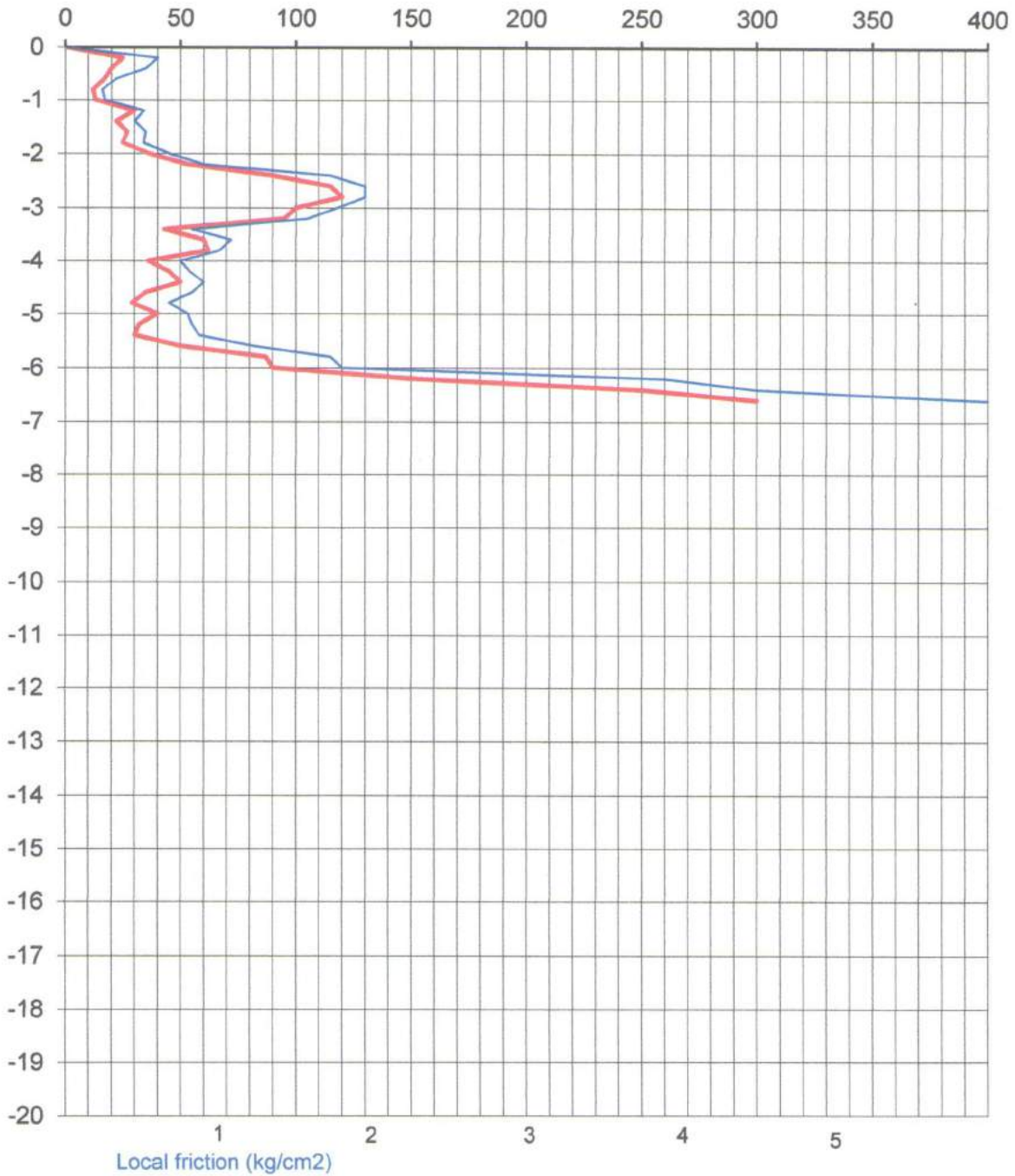
Test No.:	7
Machine:	10 Ton
Cone Type:	CF
DATE:	29-09-20
TIME:	

*[Handwritten signature]*



**(Dutch Cone Penetrometer Test)**

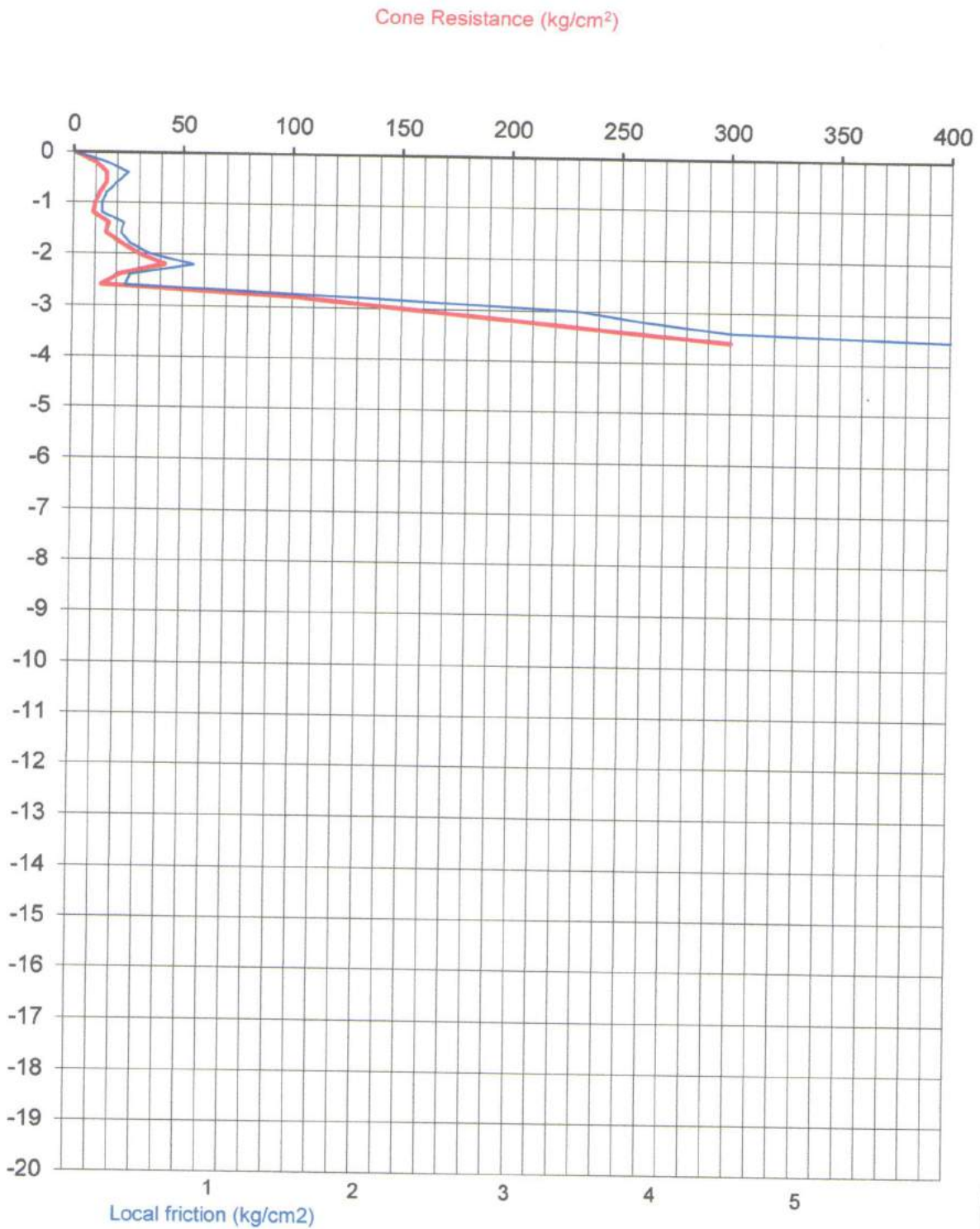
Cone Resistance (kg/cm<sup>2</sup>)



<b>Location:</b>	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	<b>Test No.:</b>	8
<b>Job No:</b>	1242	<b>Machine:</b>	10 Ton
<b>CLIENT:</b>	A.A RANO NIGERIA LIMITED.	<b>Cone Type:</b>	CF
<b>GWL:</b>	4.00m	<b>DATE:</b>	29-09-20
<b>REMARK</b>	STOP AT 6.60m	<b>TIME:</b>	

*[Handwritten signature]*  
24/11/20

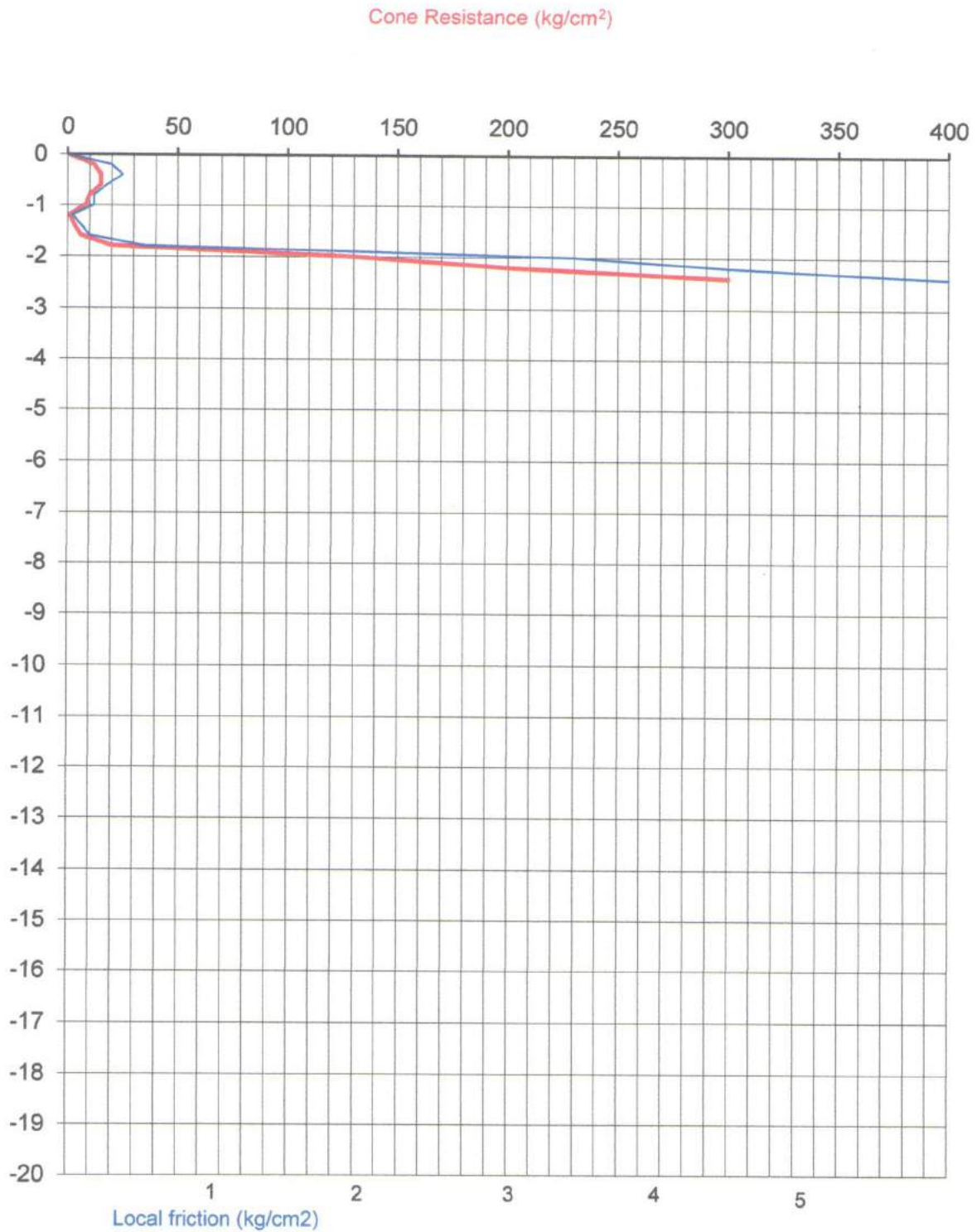
### (Dutch Cone Penetrometer Test)



Location:	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	Test No.:	9
Job No:	1242	Machine:	10 Ton
CLIENT:	A.A RANO NIGERIA LIMITED.	Cone Type:	CF
GWL:	3.00m	DATE:	29-09-20
REMARK	STOP AT 3.60m	TIME:	

29/9/20

### (Dutch Cone Penetrometer Test)



<b>Location:</b>	PROPOSED ATK BULK LIQUID STORAGE FACILITY, ABUJA.	<b>Test No.:</b>	10
<b>Job No:</b>	1242	<b>Machine:</b>	10 Ton
<b>CLIENT:</b>	A.A RANO NIGERIA LIMITED.	<b>Cone Type:</b>	CF
<b>GWL:</b>		<b>DATE:</b>	30-09-20
<b>REMARK</b>	STOP AT 2.40m	<b>TIME:</b>	

*[Handwritten signature]*  
24/11/20

# Appendix D

Laboratory Test Results



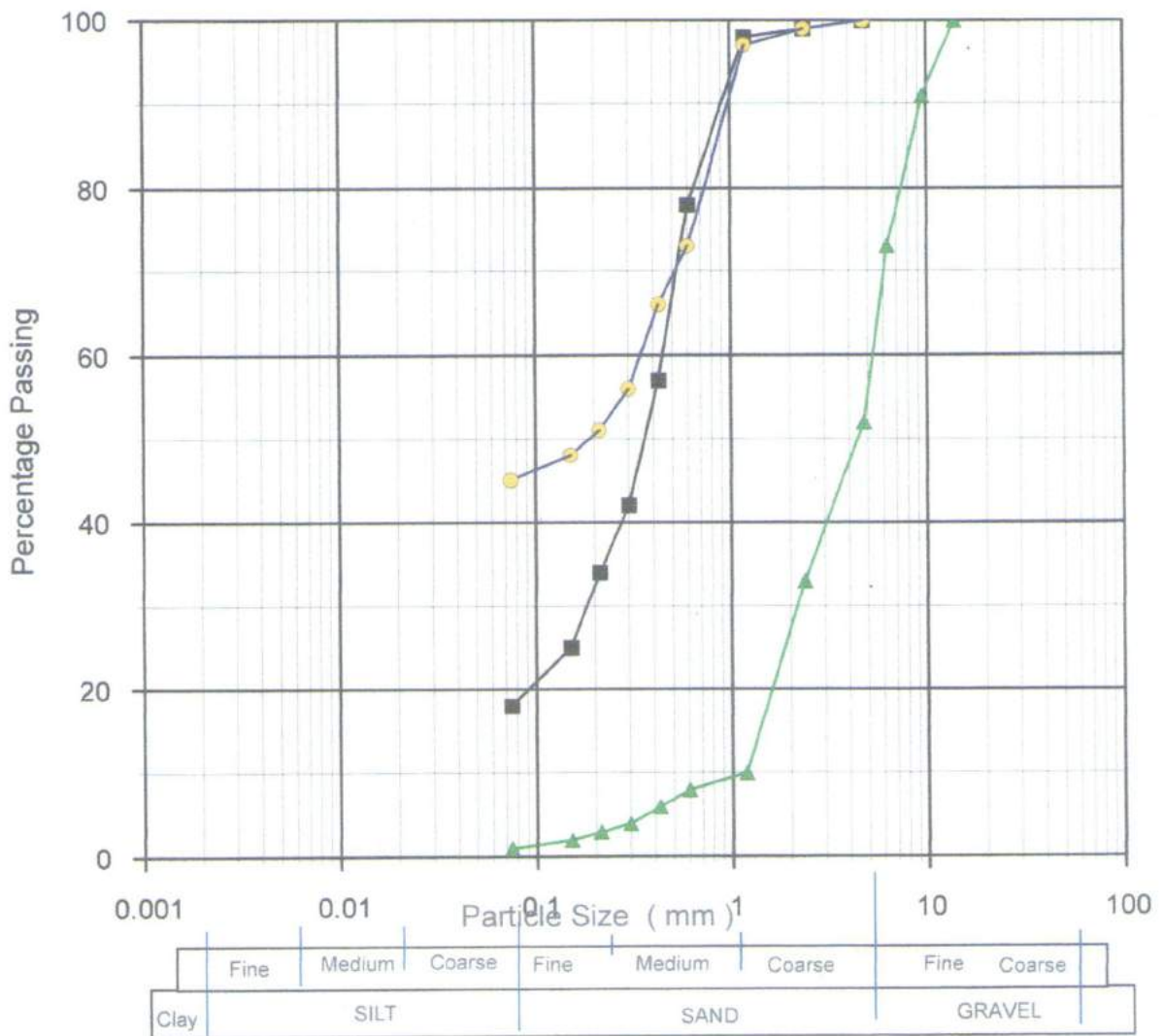
A circular stamp is partially visible, containing the text "LABORATORY AND TEST SERVICES". Overlaid on the stamp is a handwritten signature in blue ink, which appears to be "S. J. [unclear]". Below the signature, the date "2/11/20" is written in blue ink.





**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 9th November 2020

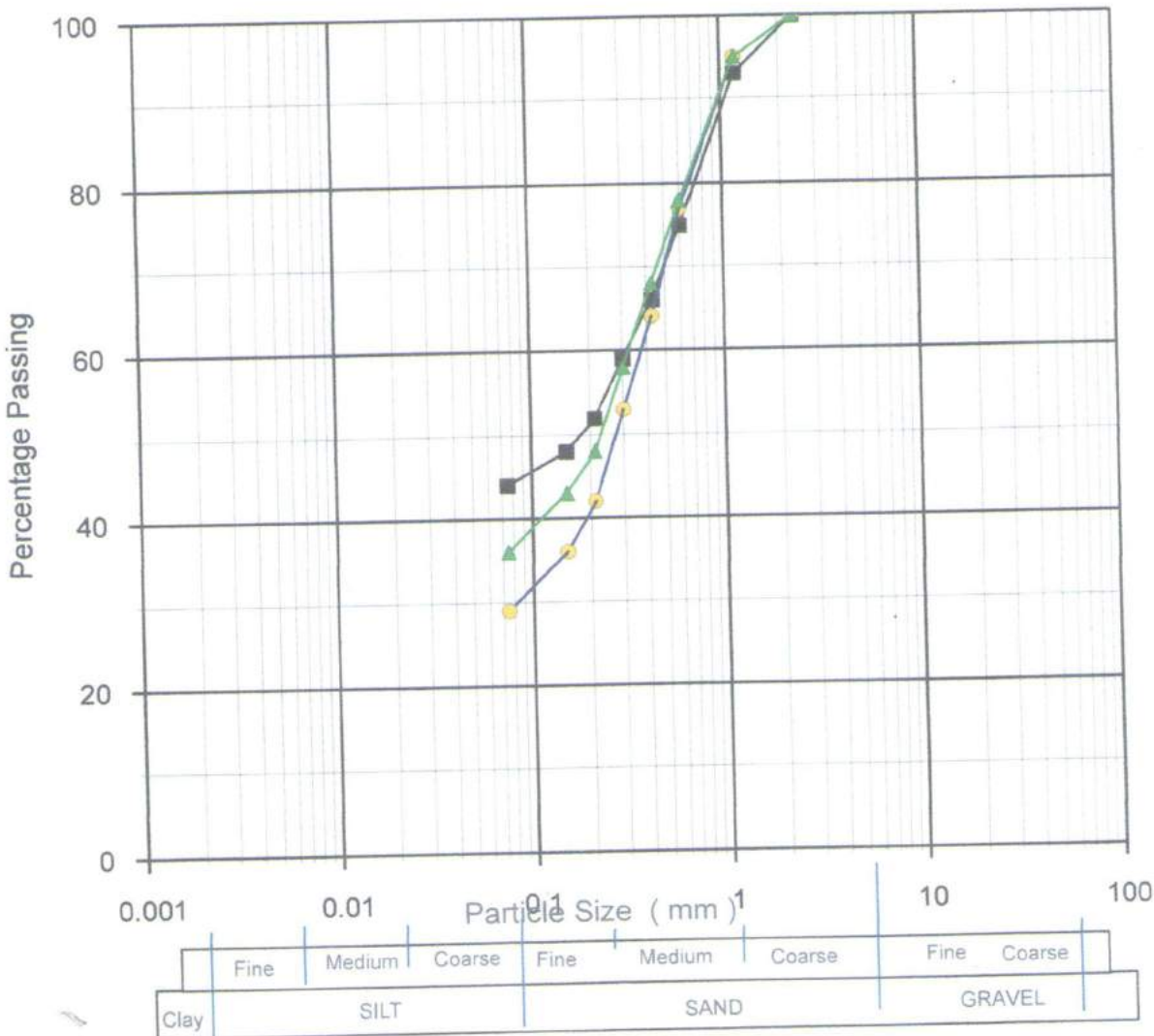
- BH 1 at 0.25m Dark Brown Fine Silty Medium Sand
- BH 1 at 1.50m Brown Laterite Silty Sandy Clay
- ▲ BH 1 at 3.00m Brown Laterite Gravel Coarse Sand



*[Handwritten signature]*  
 24/11/20

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 9th November 2020

- BH 1 at 5.25m Light Brown, Greyish Silty Sandy Clay with Mica.
- BH 1 at 7.50m Greyish Decompose Silty Clayey Sand with Mica.
- ▲ BH 1 at 9.00m Light Brown, Greyish Decompose Silty Sandy Clay with Mica.

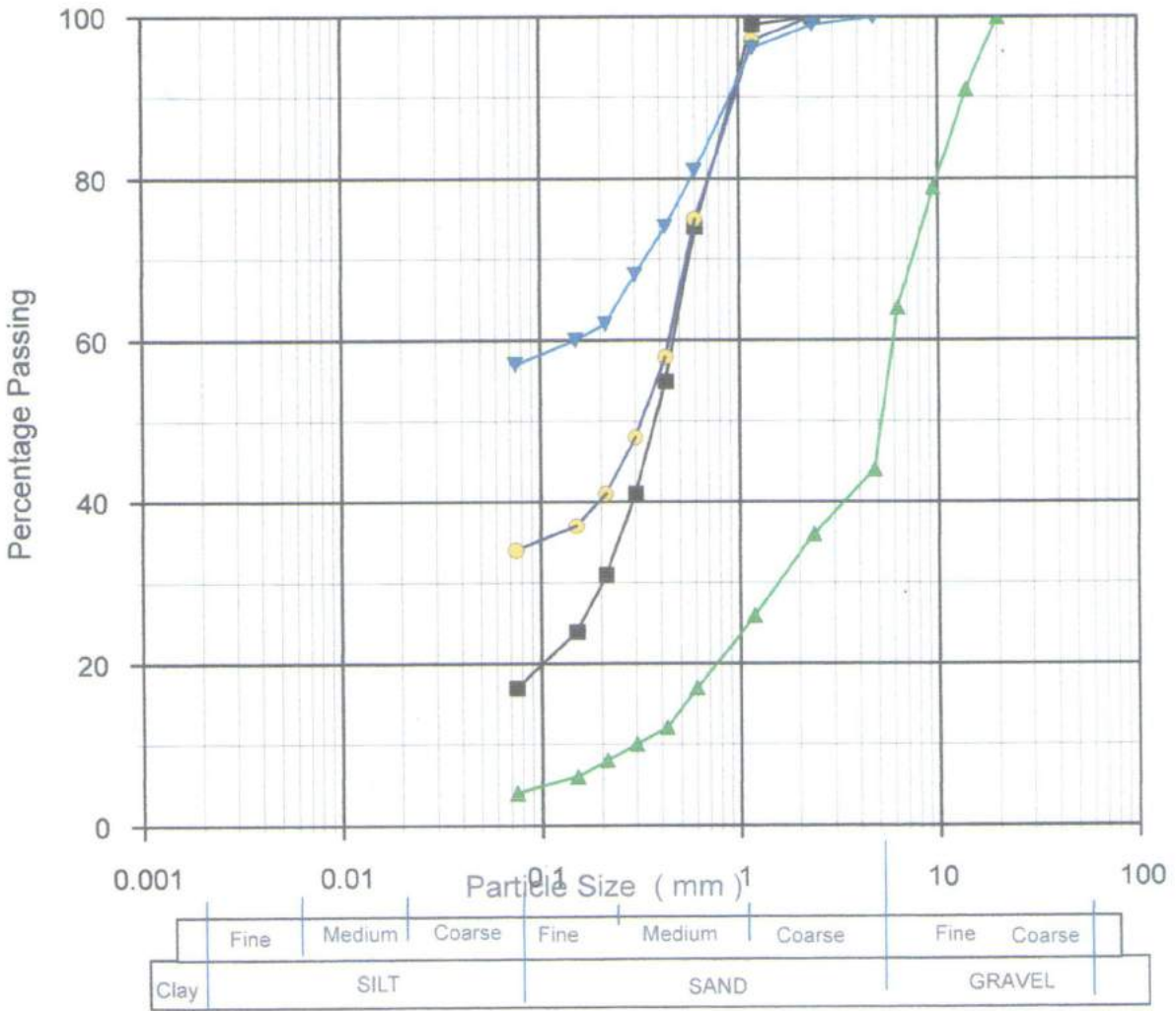


*[Handwritten signature]*  
 24/11/20



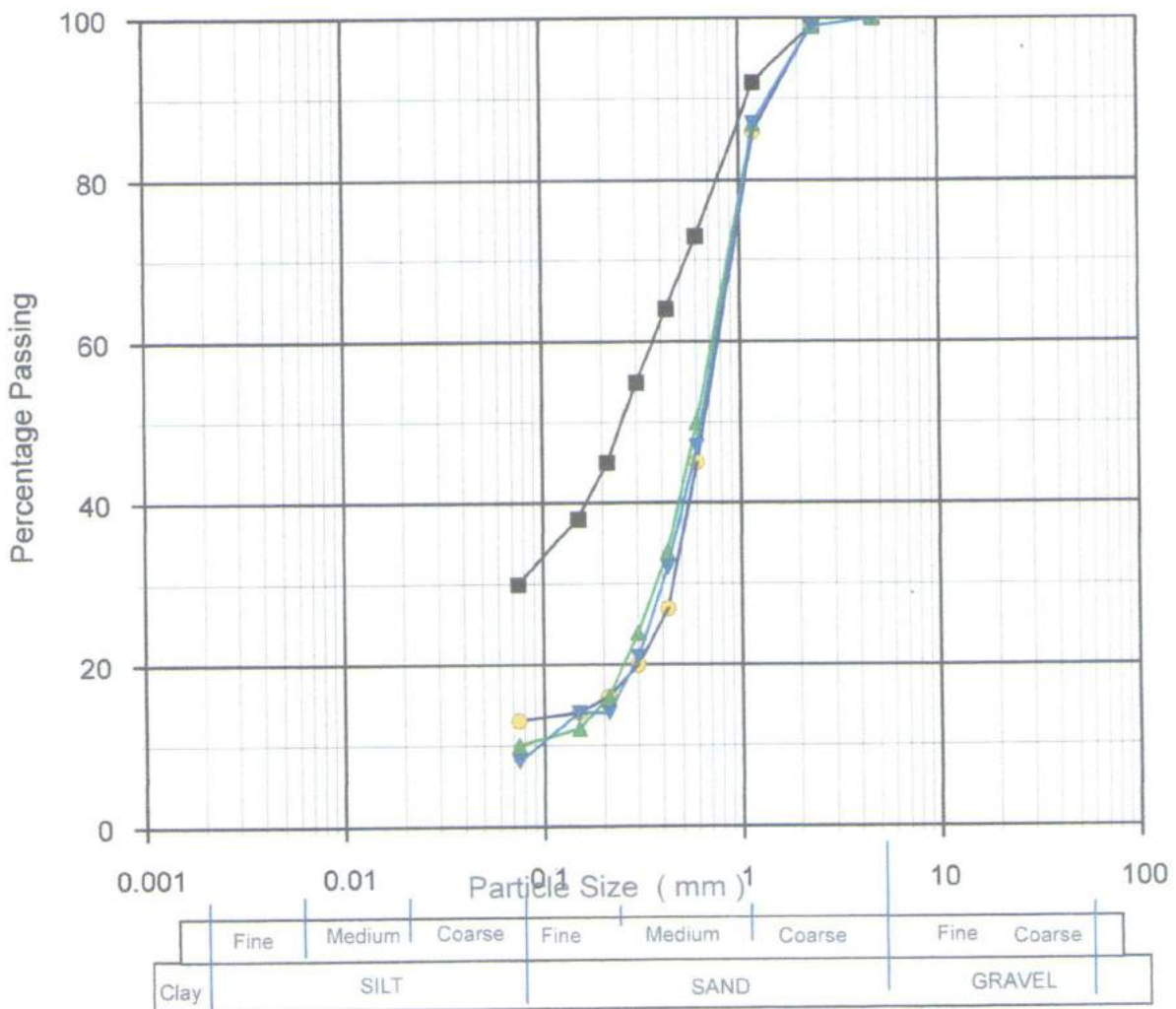
**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
**Sieve Analysis**  
**9th November 2020**

- BH 2 at 0.25m Dark Brown Silty Fine Medium Sand
- BH 2 at 0.75m Brown Laterite Silty Clayey Sand
- ▲ BH 2 at 3.00m Brown Lateritic Medium Coarse Gravel Sand
- ▼ BH 2 at 6.00m Greyish Decompose Silty Clay with Mica.



**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 9th November 2020

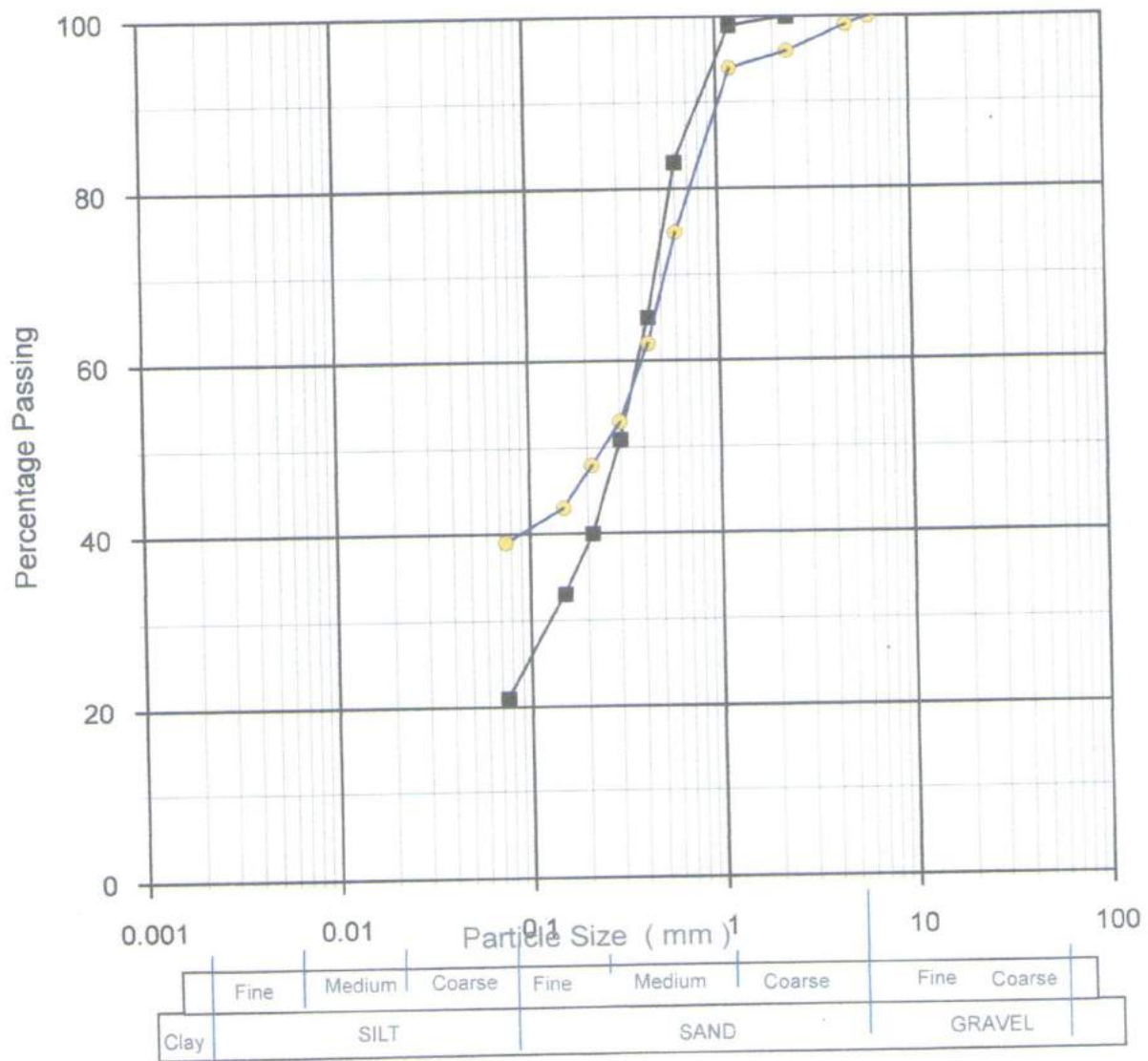
- BH 2 at 9.00m Grey Decompose Silty Clayey Sand with Mica.
- BH 2 at 10.50m Greyish Decompose Coarse Medium Sand with Silt and Mica.
- ▲ BH 2 at 12.00m - Ditto -
- ▼ BH 2 at 15.00m Light Brown. Greyish Decompose Coarse Medium Sand with Mica.



*[Handwritten Signature]*  
 24/11/20

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 9th November 2020

BH 3 at 0.25m Light Brown Silty Fine Medium Sand  
 BH 3 at 1.50m Brown Laterite Silty Sandy Clay



*[Handwritten signature]*

**SUMMARY OF LABORATORY TEST RESULTS**

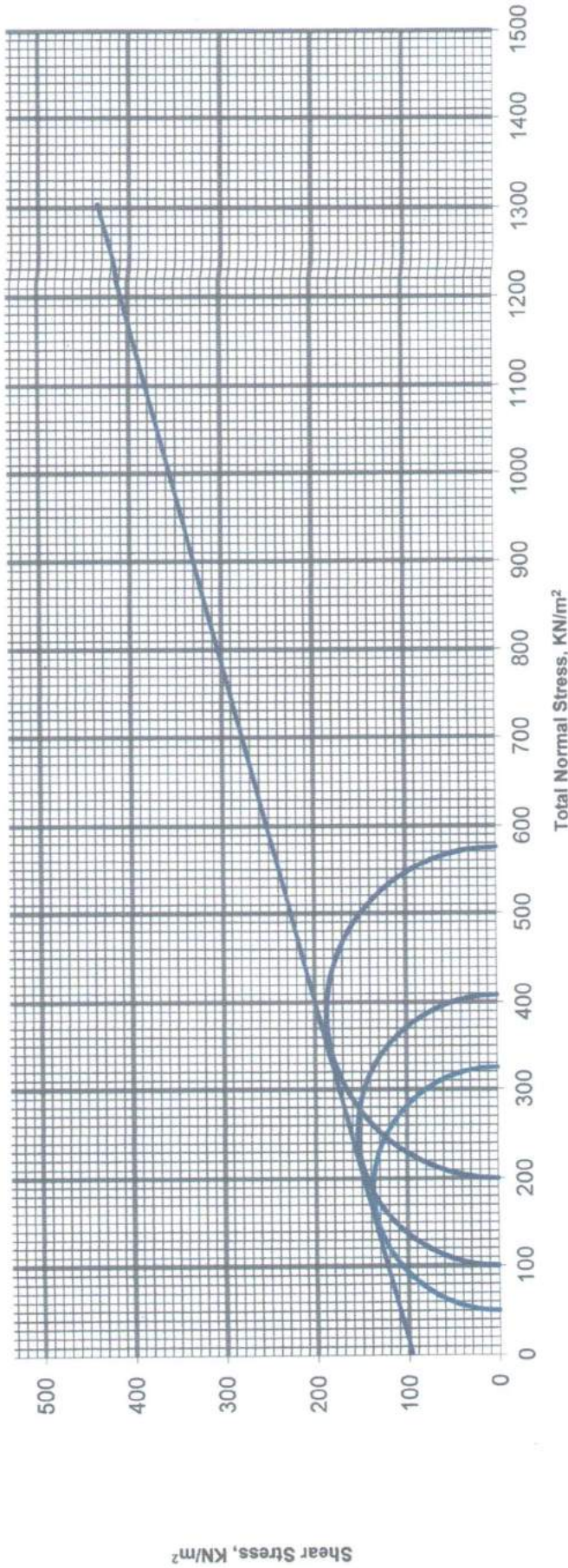
**PROPOSED A.A RANO ATK BULK LIQUID STORAGE FACILITIES, FCT ABUJA .**

SAMPLE DETAILS			Moisture content %	Triaxial compression test		Consolidation Test		
BH/Sample no.	Depth in metres	Description		BULK DENSITY Mg/m <sup>3</sup>	Cohes. KN/m <sup>2</sup>	Angle of friction $\phi_u^\circ$	Pressure range KN/m <sup>2</sup>	Coefficient of consolidation CV/m <sup>2</sup> /year
2	4.5	Reddish brown ,yellow stiff laterite silty sandy clay	2.05	95	15	0-25 25-50 50-100 100-200 200-400	3.878 3.176 11.504 7.965 3.698	0.1615 0.1622 0.1222 0.0615 0.0621

Handwritten signature and date: 2/11/20

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT

Borehole:	2
Depth(m):	4.50
6th November 2020	

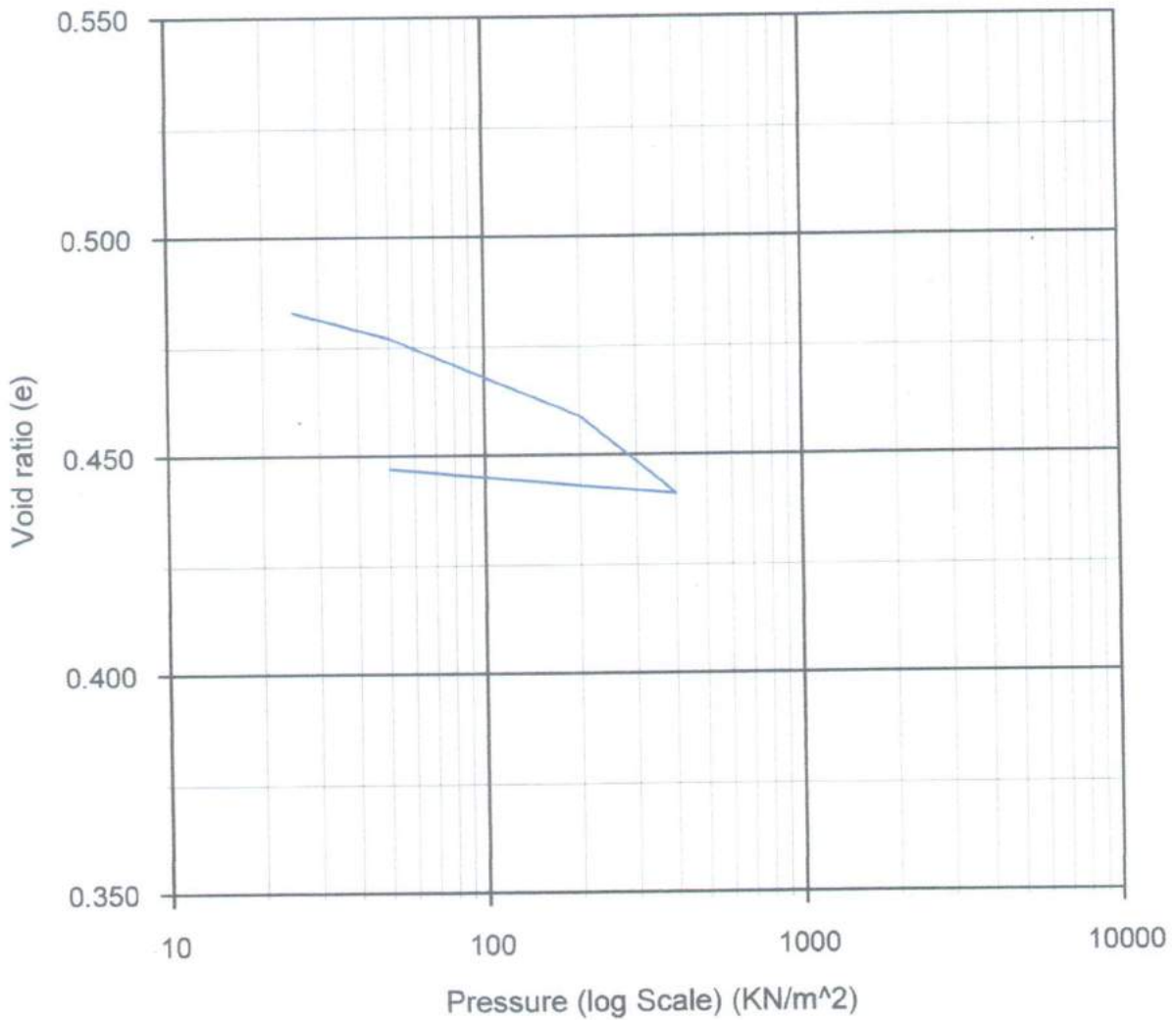


Undrained Cohesion	95 $\text{KN/m}^2$
Angle of Friction ( $\phi$ )	15 deg

*[Handwritten signature]*

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**

Consolidation: BH 2 Depth : 4.50m  
6th to 7th November 2020



Initial moisture content : 16%  
Initial wet density : 2.05 mg/m<sup>3</sup>  
Initial void ratio: 0.489, Cc= 0.060, Sr.= 86%

**SUMMARY OF LABORATORY TEST RESULTS**

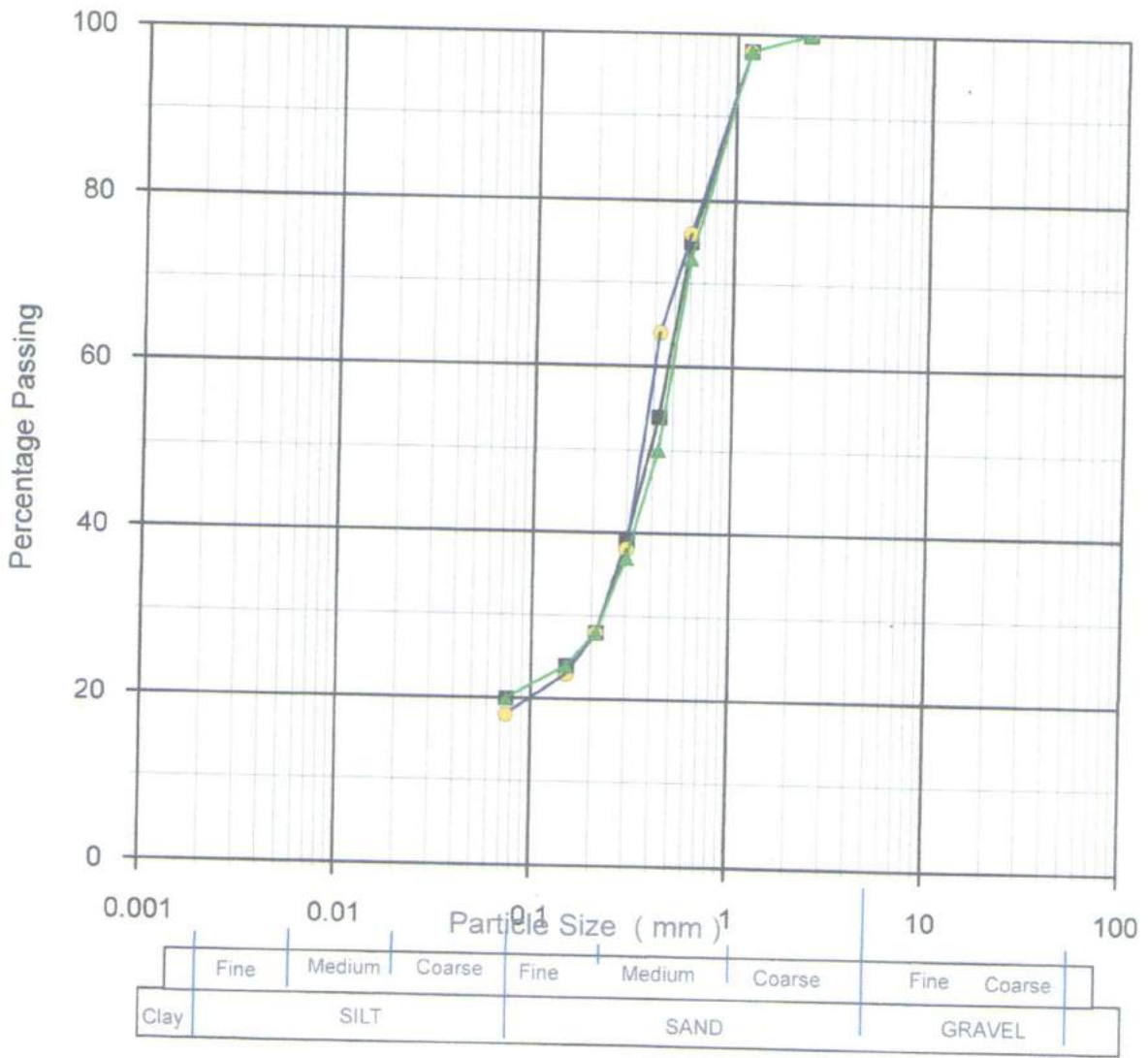
DATE: 9-11-2020 Sheet No: 1

**PROJECT: PROPOSED A.A RANO ATK BULK LIQUID STORAGE FACILITIES, FCT ABUJA.**

TEST PIT	Sample		Soil Depth Sym	Grading Analysis, Percentage Passing																Atterberg Limits			WAS Proctor comp.		UNSOAKED CBR %		ISOAKED CBR % T( BOT			
	No	Type		37.5	25	20	14	9.5	6.3	4.75	2.36	1.18	600	425	300	212	150	75	MC %	LL %	PL %	P1 %	OA	MDD	TOF BOT	42		45	24	28
				mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	um	um	um	um	um												
TP1	1	SC	0.5							100	98	75	54	39	28	24	20	9	30	16	14	7.8	2	42	45	24	28			
	2	SP/SM	1						100	98	76	54	38	28	23	18		12												
	3	SC	2						100	98	73	50	37	28	24	20		12												
TP2	1	SP/SM	0.5						100	99	77	57	41	29	23	18		8												
	2	SP/SM	1						100	98	76	55	39	29	24	17		8					8.3	1.9	38	35	18	20		
	3	SC	2						100	98	77	59	44	33	28	23		8	33	18	15									
TP3	1	SC	0.5						100	98	75	55	41	31	26	22		11												
	2	SC	1					100	99	97	73	49	37	30	27	24		25	37	20	17	9.1	1.9	38	42	20	23			
	3	IRK	2															6												

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 11th November 2020

- TP 1 at 0.50m Brown Laterite Silty Clayey Sand
- TP 1 at 1.00m - Ditto -
- ▲ TP 1 at 2.00m Brownish Laterite Silty Clayey Sand

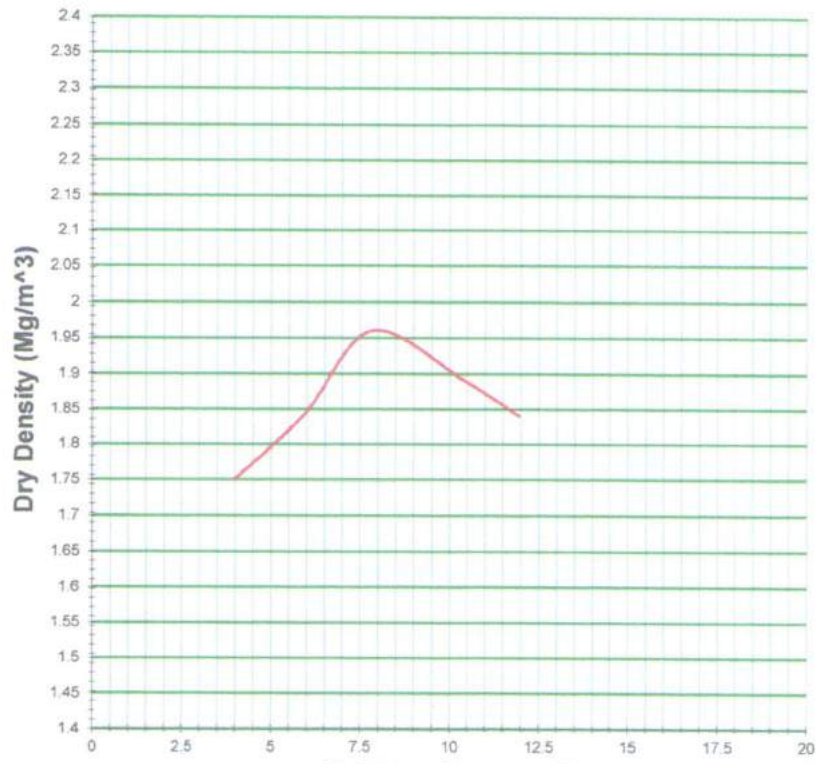


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PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE  
FACILITIES ABUJA, FCT  
W. A .S COMPACTION

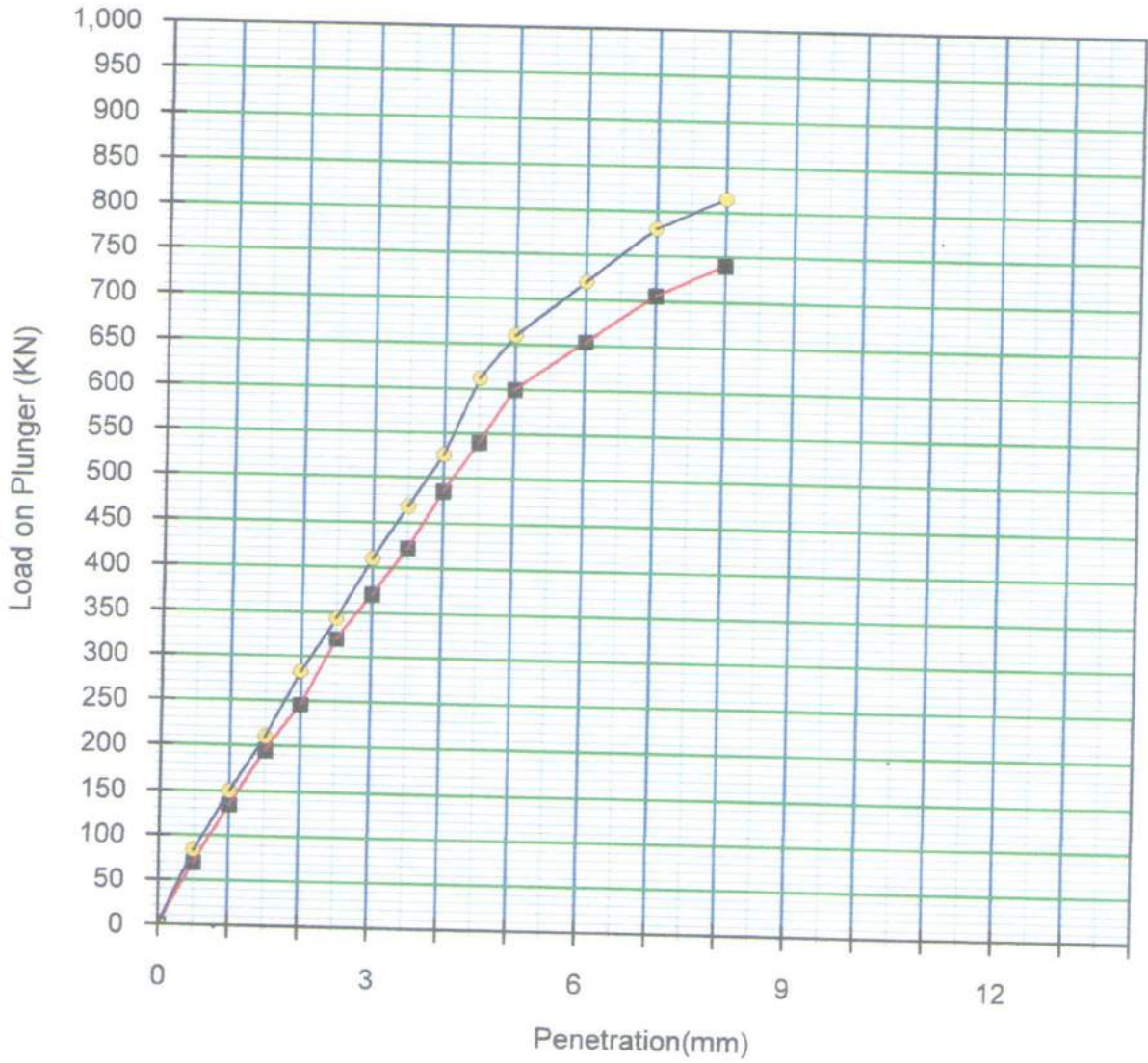
TP 1 at 0.50 m DATE: 26th July 2018



**Moisture Content (%)**  
**Optimum moisture content 7.43%**  
**Maximum dry density 1.96 mg/m<sup>3</sup>**

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
TP 1 at 0.50m ( Unsoaked CBR ) Type W.A.S  
9 - 11 - 2020

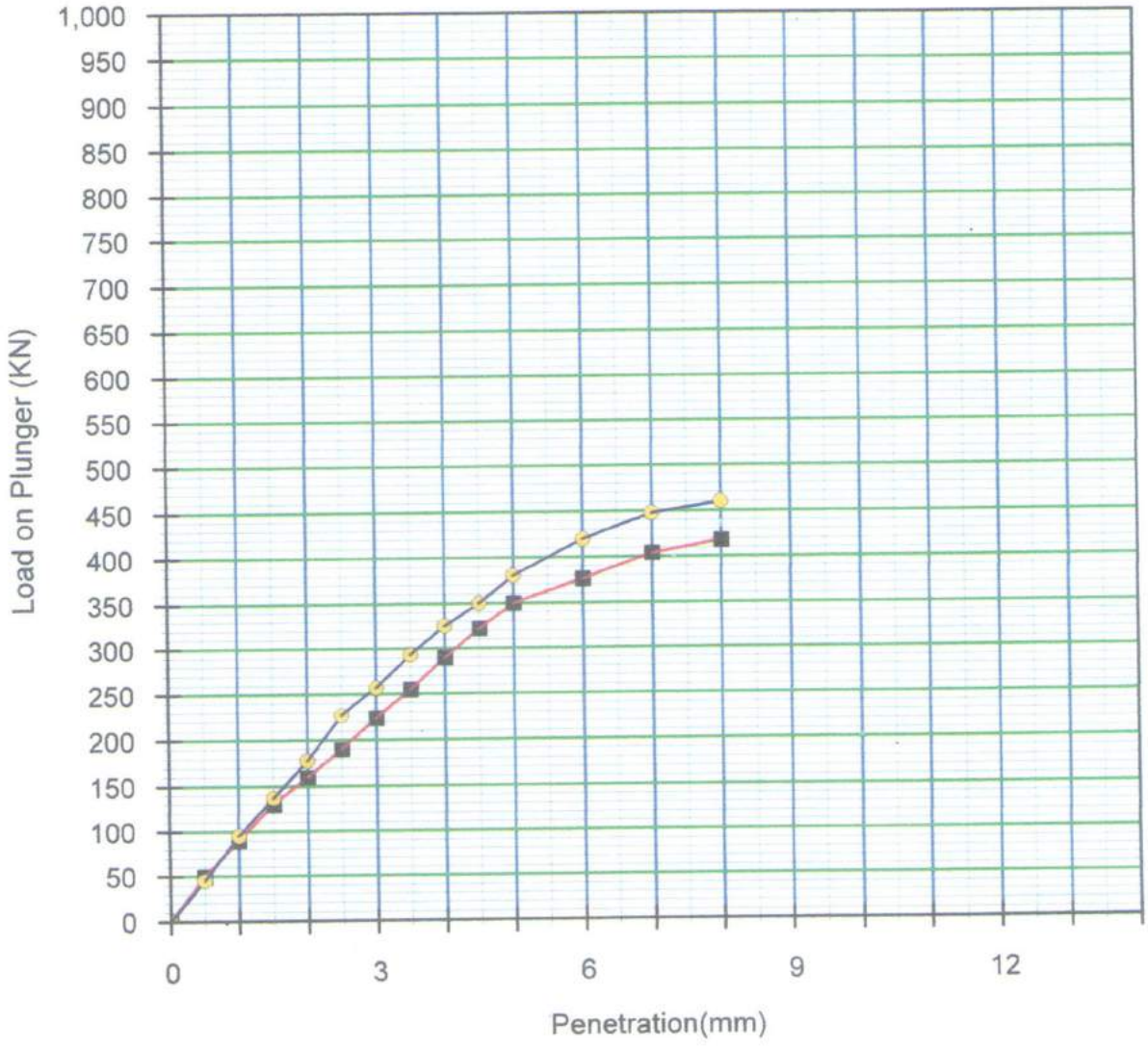
■ Top ● Bottom



CBR %  
TOP 42 %  
BOTTOM 45 %

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
TP 1 at 0.50m soaked {48 hours ) Type W.A.S  
12 - 11 - 2020

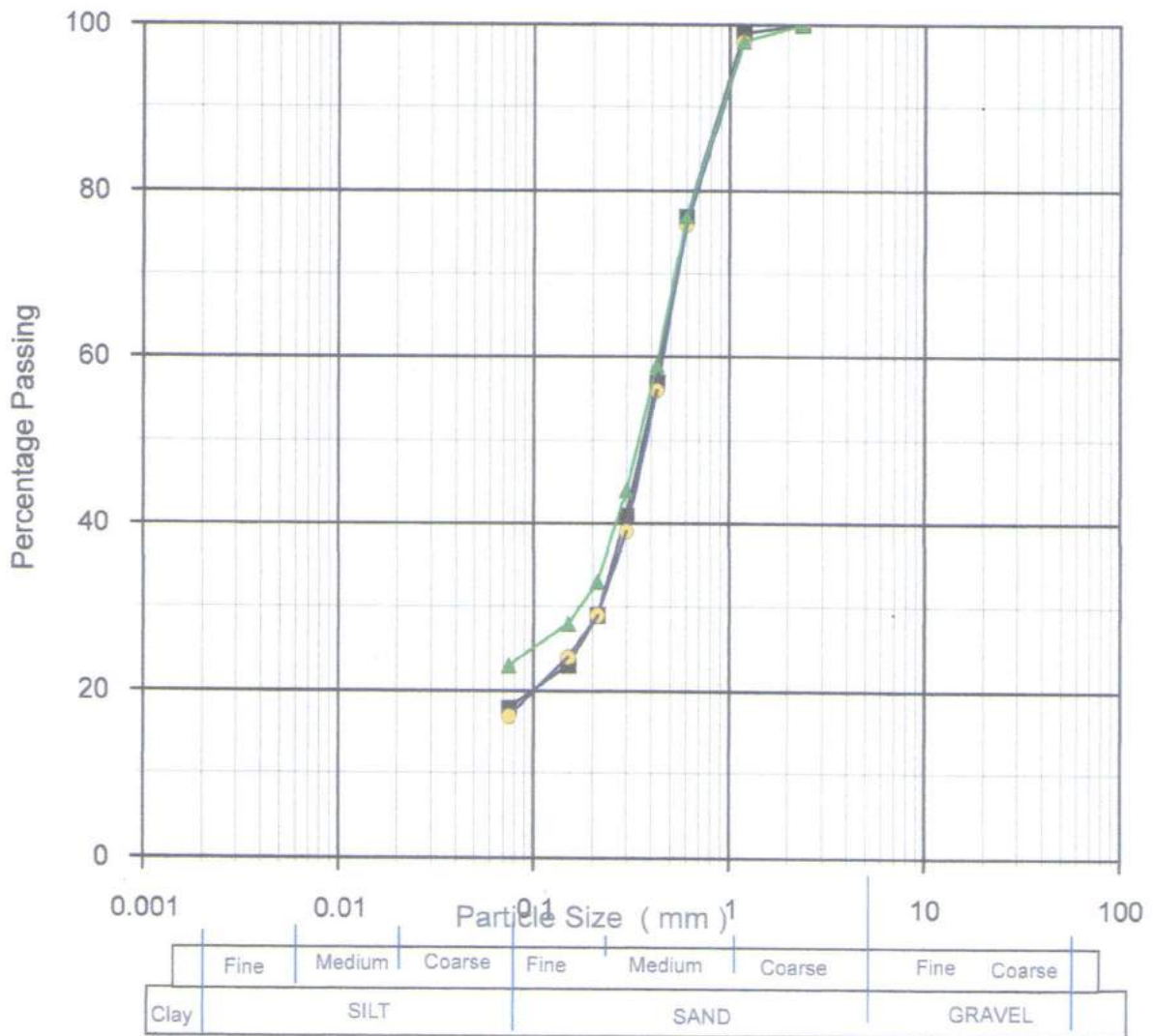
■ Top ● Bottom



CBR %  
Top 24 %  
BOTTOM 28 %

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
**Sieve Analysis**  
**11th November 2020**

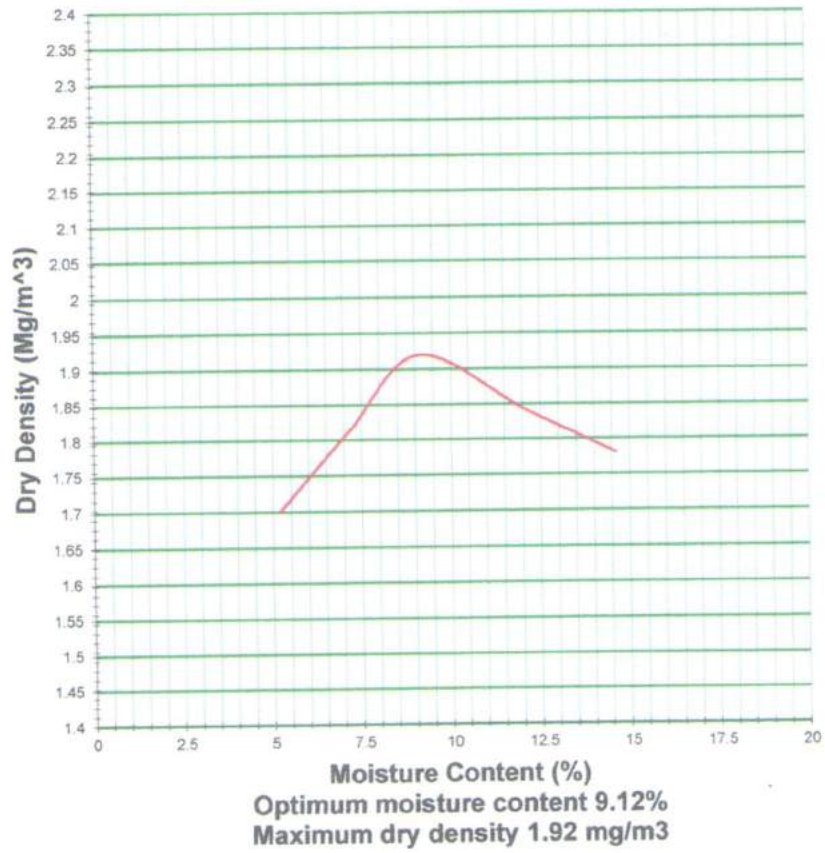
- TP 2 at 0.50m Brown Fine Silty Medium Sand
- TP 2 at 1.00m - Ditto -
- ▲ TP 2 at 2.00m Brown Laterite Silty Clayey Sand



*[Handwritten signature]*

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE  
FACILITIES ABUJA, FCT  
W. A .S COMPACTION

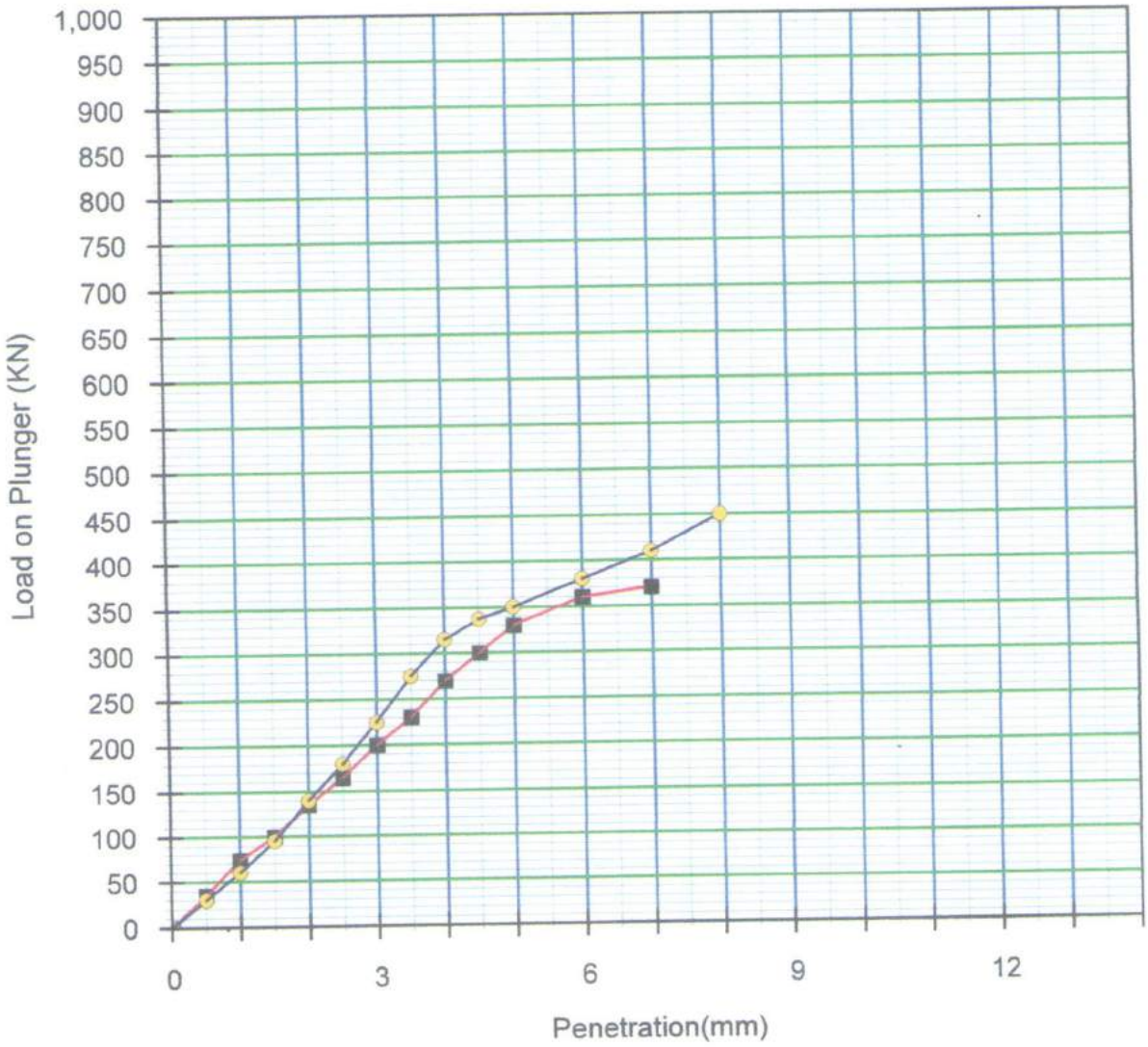
TP 2 at 1.00m DATE: 7th November 2020



*[Handwritten signature]*  
2/11/20

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
 TP 2 at 1.00m ( Unsoaked CBR ) Type: W.A.S  
 9 - 11 - 2020

■ Top    ● Bottom

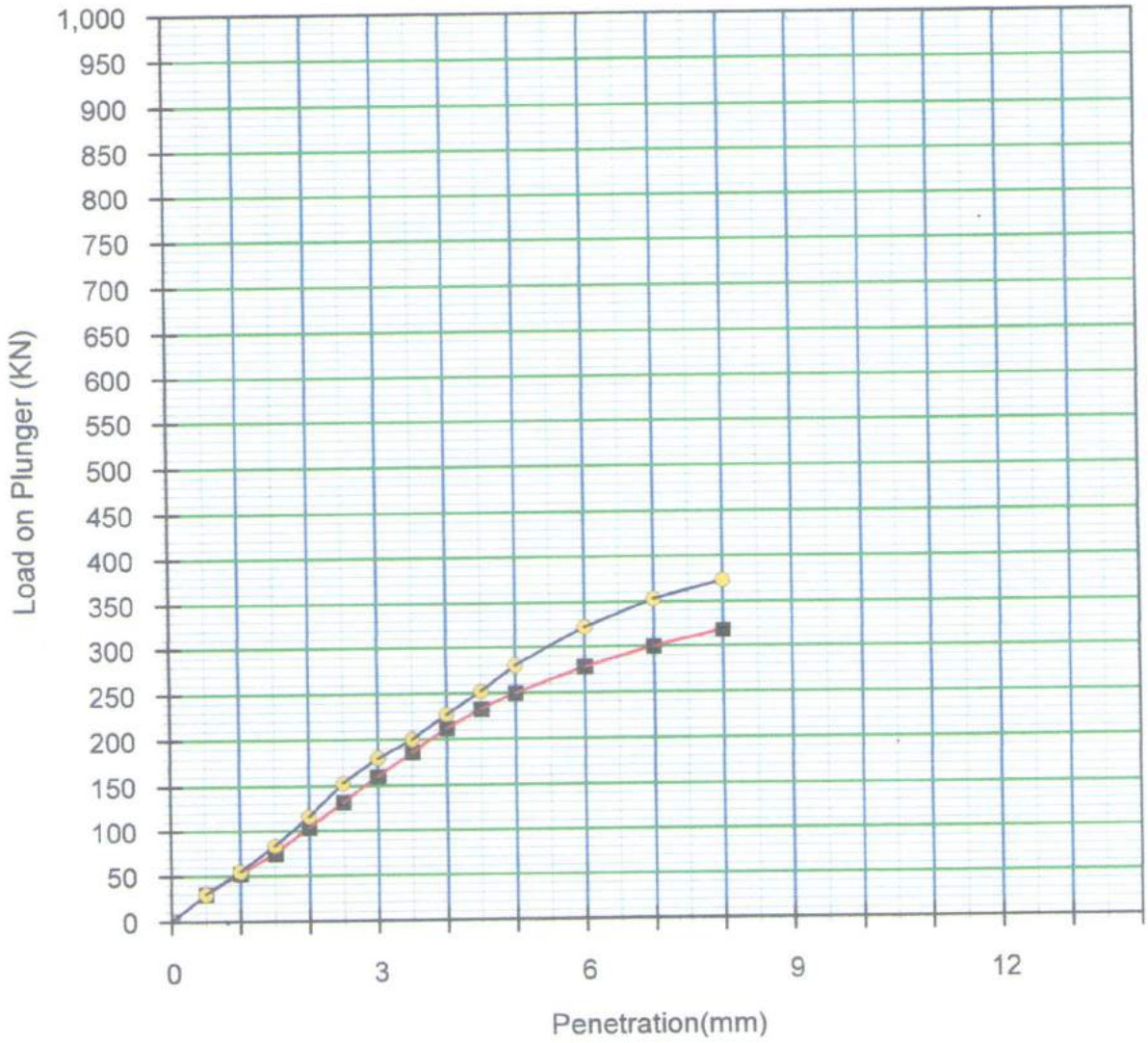


CBR %  
 TOp 38 %  
 BOTTOM 35 %

*[Handwritten signature]*

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
TP 2 at 1.00m soaked (48 hours ) Type W.A.S  
14 - 9 - 2020

■ Top    ● Bottom

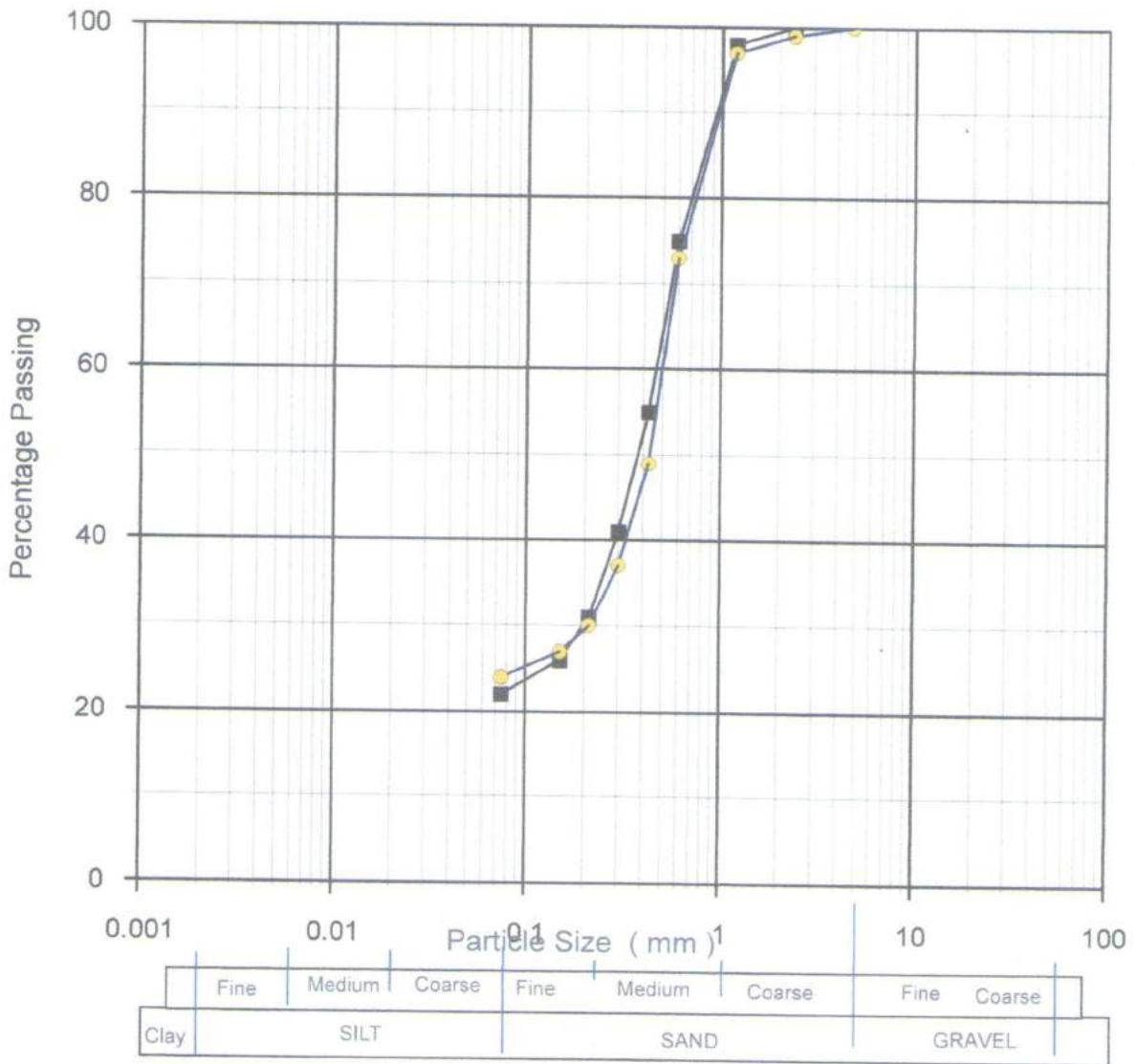


CBR %  
Top 18 %  
BOTTOM 20%

*[Handwritten signature]*  
24/11/20

**PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT**  
 Sieve Analysis  
 11th November 2020

■ TP 3 at 0.50m Brown Laterite Silty Clayey Sand  
 ● TP 3 at 1.00m - Ditto -

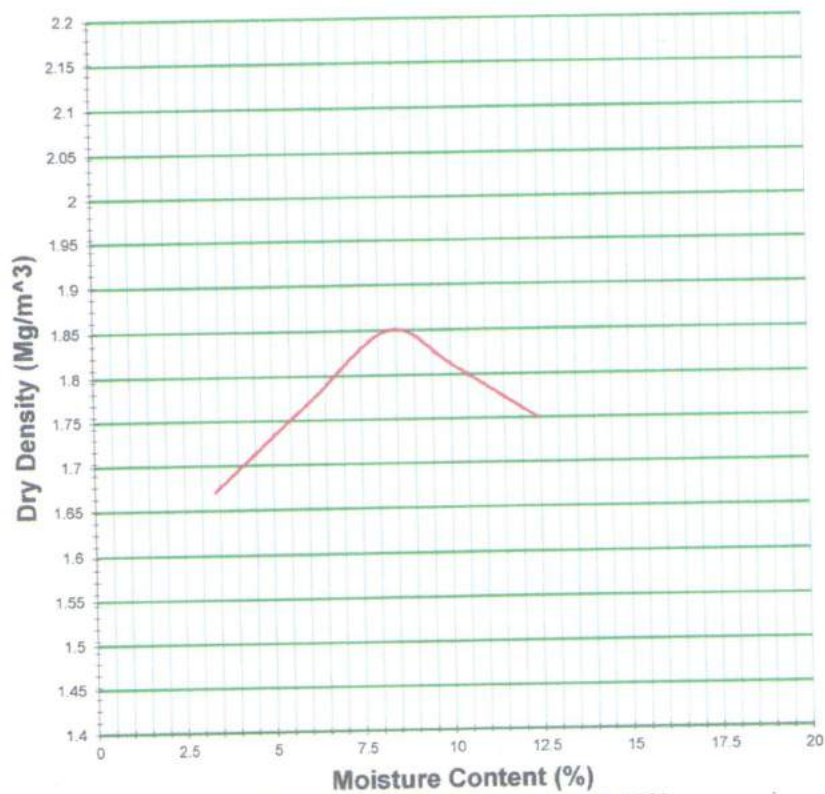


*[Handwritten signature]*  
 24/11/20



PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE  
FACILITIES ABUJA, FCT  
W. A .S COMPACTION

TP 3 at 1.00m DATE: 7th November 2020

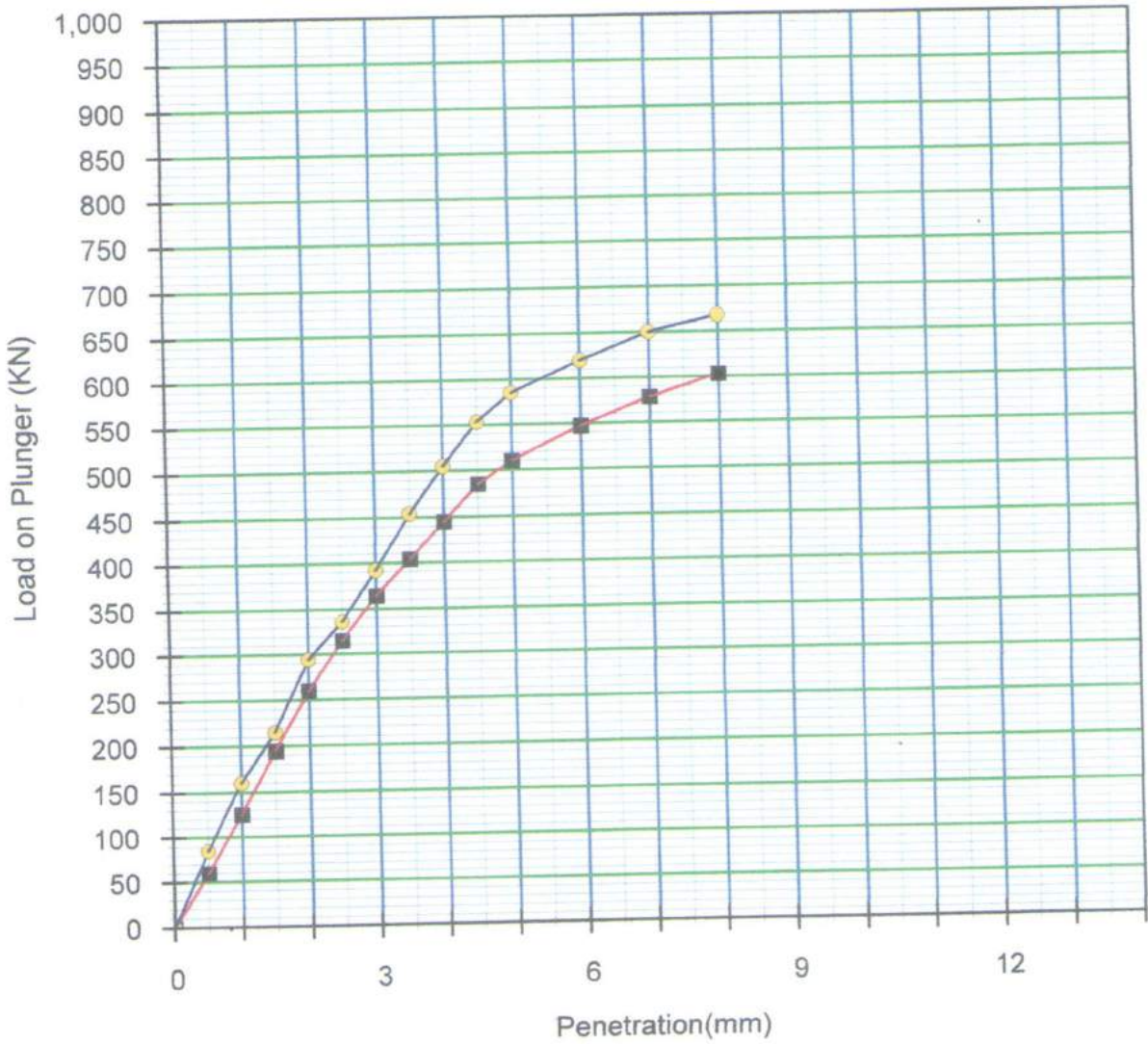


Moisture Content (%)  
Optimum moisture content 8.30%  
Maximum dry density 1.85 mg/m3

*[Handwritten signature]*  
24/11/20

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
TP 3 at 1.00m ( Unsoaked CBR ) Type W.A.S  
9 - 11 - 2020

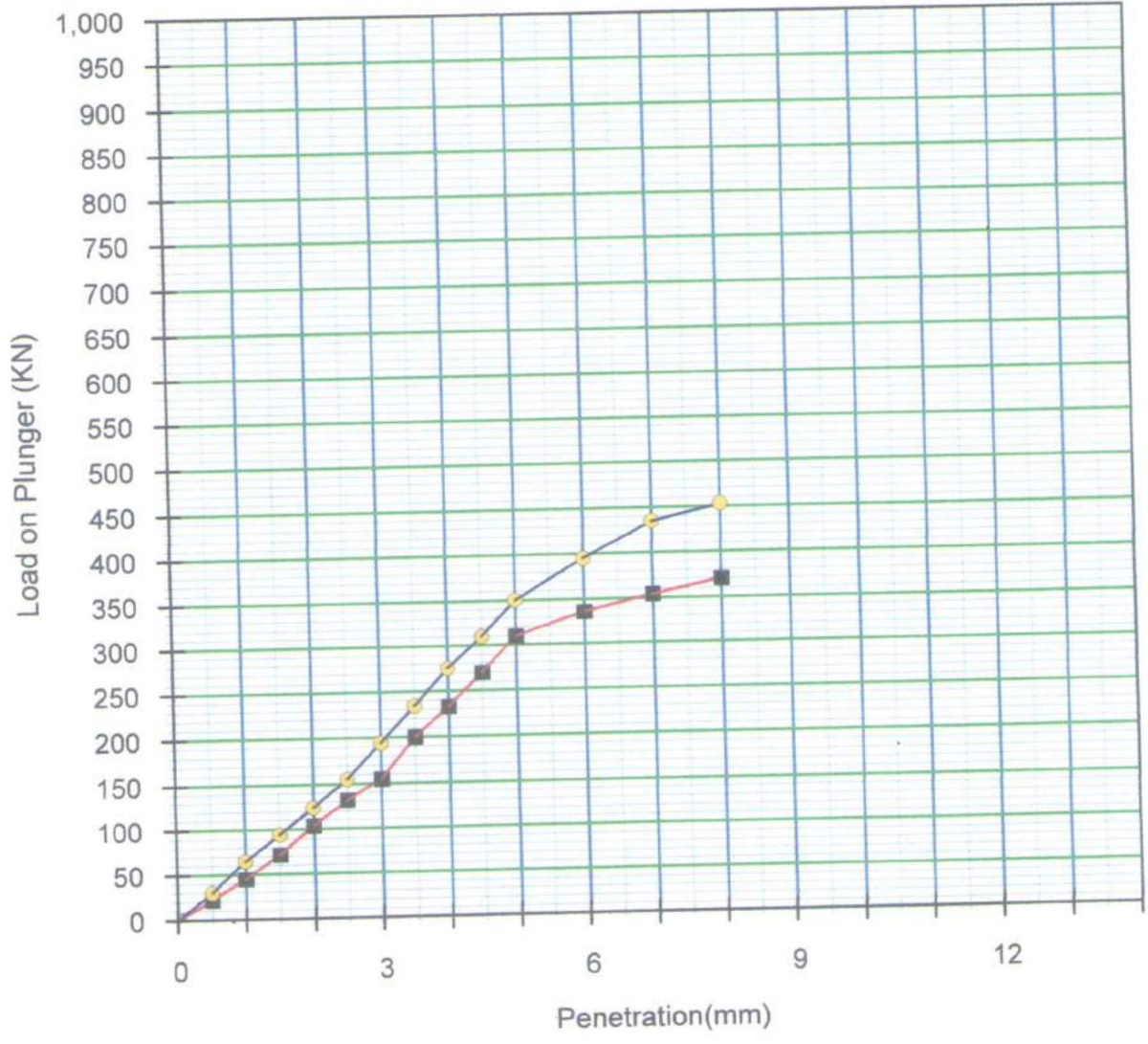
■ Top    ● Bottom



CBR %  
Top 38 %  
BOTTOM 42 %

PROJECT: PROPOSED A A RANO ATK BULK LIQUID STORAGE FACILITIES ABUJA, FCT  
 TP 3 at 1.00m soaked {48 hours } Type W.A.S  
 12 - 11 - 2020

■ Top    ● Bottom



CBR %  
 Top 20 %  
 BOTTOM 23 %

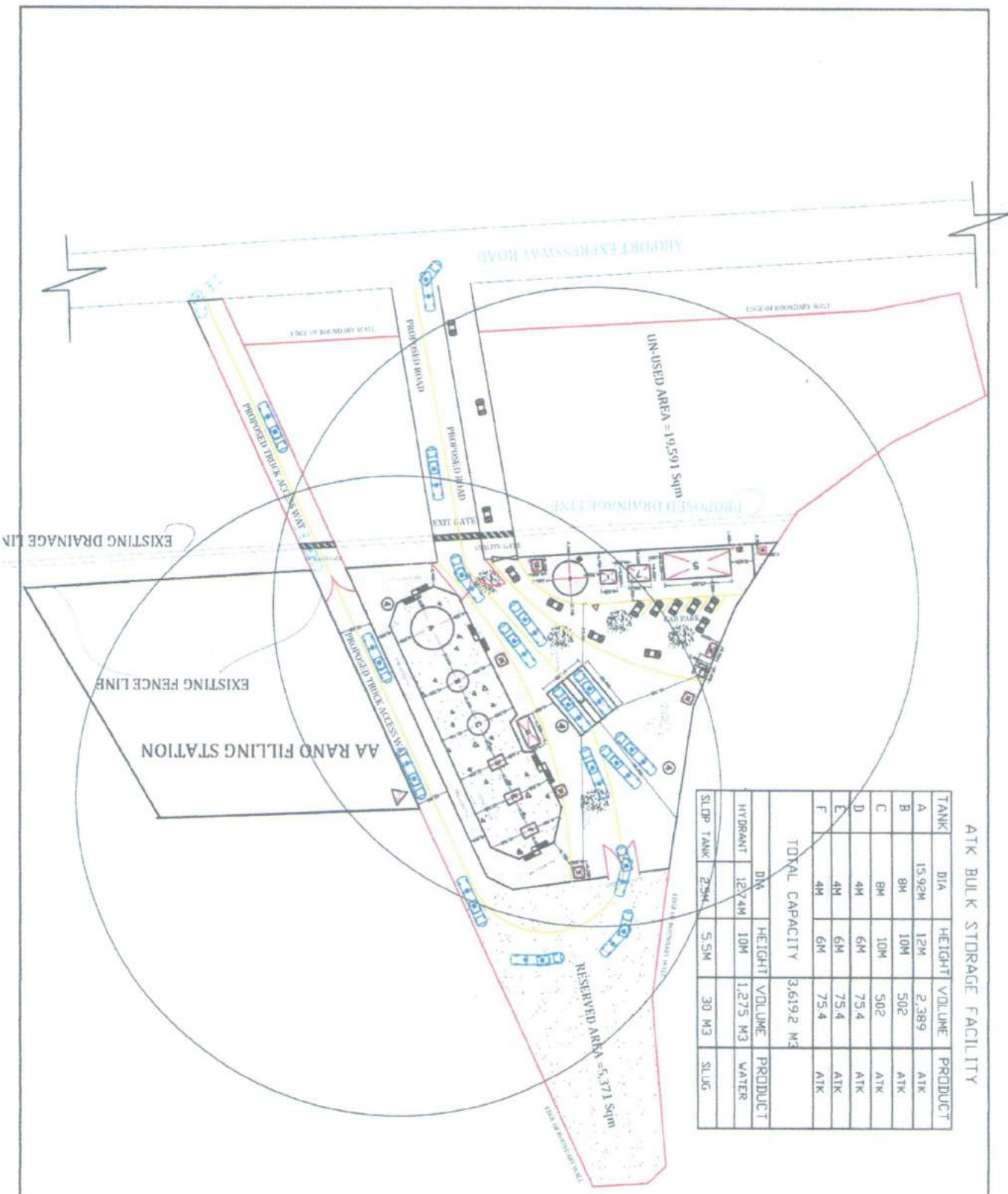
*[Handwritten signature]*  
 2/11/20

# Appendix E

Site Plan

ATK BULK STORAGE FACILITY

TANK	DIA	HEIGHT	VOLUME	PRODUCT
A	15.92M	12M	2,389	ATK
B	8M	10M	502	ATK
C	8M	10M	502	ATK
D	4M	6M	75.4	ATK
E	4M	6M	75.4	ATK
F	4M	6M	75.4	ATK
TOTAL CAPACITY			3,619.2 M <sup>3</sup>	
DM		HEIGHT	VOLUME	PRODUCT
HYDRANT	12V4M	10M	1,275 M <sup>3</sup>	WATER
SLOP TANK	2.5M	5.5M	30 M <sup>3</sup>	SLUG



General Notes

**PROJECT NAME AND LOCATION**  
AA RANO ATK Bulk Liquid Storage  
Facilities, Abuja

LEGEND

- 1 FIRE PUMP SHED
- 2 FIRE WATER TANK
- 3 LOADING & UNLOADING Gantry
- 4 OBSERVATION WELL
- 5 ADMIN BUILDING
- 6 OVERHEAD WATER TANK
- 7 GENERATOR SHED
- 8 TRANSFORMER
- 9 EXIT GATE HOUSE
- 10 ENTRANCE GATE HOUSE
- 11 PRODUCT PUMP SHED
- 12 SLOP TANK
- 13 OILY WATER SEPARATOR PIT
- 14 INDUSTRIAL BURNER
- 15 FIXED FOG MONITOR
- 16 LIGHTNING ARRESTER  
100M RADIUS

AREA

TOTAL LAND AREA = 41,05 Sqm  
UN-USED AREA = 19,591 Sqm  
FACILITY AREA = 13,042 Sqm  
RESERVED AREA = 5,371 Sqm  
TRUCK ACCESS AREA = 3,101 Sqm

ALL DIMENSIONS ARE IN MM EXCEPT OTHERWISE STATED

NO	DESCRIPTION	DATE	BY
1	PRELIMINARY	2017	AA RANO

Client

**A.A. RANO NIG. LTD**

Designing This GENERAL SITE LAYOUT

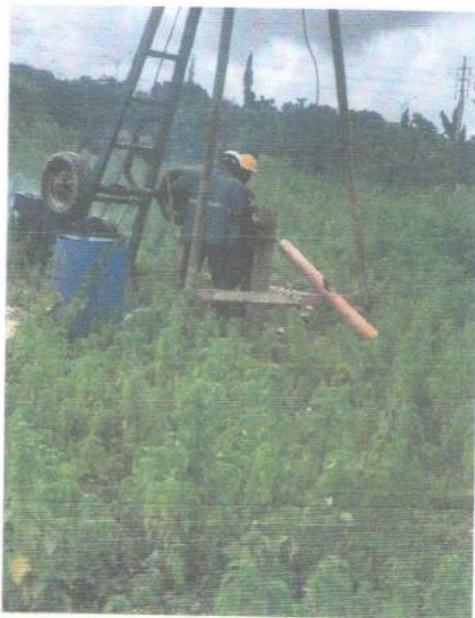
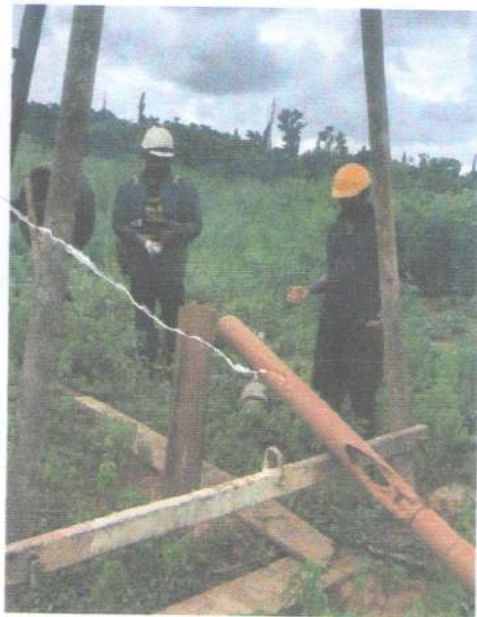
DATE	SCALE	DATE	DATE
2017	1:100	2017	2017

**AVANTAGE ENGINEERING SERVICES LIMITED**  
1, ADEOLA OBIYAN ROAD, OFFICE 101, WILSON BRIDGE, LAGOS STATE, NIGERIA  
TEL: 01-2533154/2533155  
WWW.AVANTAGEENGINEERING.COM



# Appendix F

Site Photographs



*Handwritten signature or initials in blue ink.*

## **APPENDIX C**

### **ATTENDANCE AT STAKEHOLDERS' MEETINGS HELD IN VIEW OF THE PROPOSED A. A. RANO NIGERIA LTD'S ATK DEPOT AT AVIATION VILLAGE, ABUJA**

----- Pages 1-3

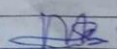

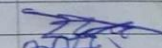

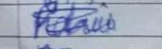
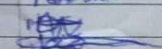
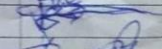
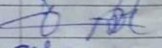
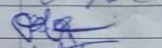
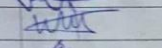
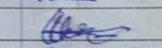

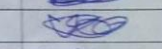
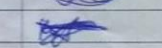
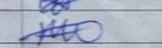
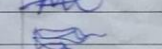
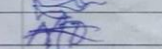
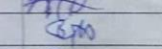
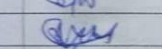

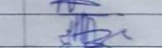
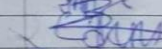
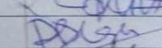



ATTENDANCE SHEET - PROPOSED A. A. RANO NIGERIA LIMITED'S ABUJA ATK DEPOT AT AVIATION VILLAGE, AMAC, ABUJA FCT

STAKEHOLDERS' CONSULTATION

## ATTENDANCE SHEET

CONSULTATION HELD WITH STAKEHOLDERS ON SAT. OCT. 17, 2020 AT A.A. RANO FILLING STATION, CONFERENCE RM BESIDE PROPOSED SITE IN RESPECT OF THE PROPOSED A. A. RANO NIGERIA LIMITED'S AVIATION TURBINE KEROSENE (ATK) DEPOT PROJECT BEING SITED AT AVIATION VILLAGE, ALONG NNAMDI AZIKIWE INTERNATIONAL AIRPORT ROAD, ABUJA MUNICIPAL AREA COUNCIL (AMAC), ABUJA FCT

S/NO	NAME	ADDRESS	ORGANIZATION /COMMUNITY	TELEPHONE	E-MAIL	REMARKS	SIGN/DATE
1	Muhammed Atim	Zamani Village		08133943223			 17/10
2	Tube Icasoy	DPO IDDO		08036017227			 12
3	Sani Amara S	A.A Rano Ng		08065310212			
4	Zakara Aliyu	Zamani village		09052093672			
5	Baki Su maddu	Zamani village		08136833678			
6	Muhammed PABU	Zamani village		08179150742			
7	IBRAHIM S. PHDA	ZAMANI		08097423848			
8	BATO KURE			09059682525			
9	JAKOREE ABE			07610750204			
10	USMANE WAKILI			08158645234			
11	SUMDANG BAJAZ	Zamani		08120345781			
12	Sani Pada	Zamani		0802791055			
13	Abdulaziz Ibrahim	Zamani		09075820889			
14	IBRAHIM BAMA	Zamani		08076177055			
15	MOHAMMED IBRAHIM	Zamani		08157870409			
16	Muhammed Ibrahim	Zamani		04018599885			
17	YUSUF ADAMU	ZAMANI		07059566974			
18	Adnanu S. Bada	Zamani		07067020649			
19	KASIM IBRAHIM	Zamani		090911675050			
20	MUSA WAKILI	ZAMANI		07069525751			
21	DANLADI WAKILI	ZAMANI		08163312436			
22	Jacob Aze	SG Bakre & Associates		08037035806			
23	Feleken Eze	SG Bakre & Associates		08135744108			
24	Paul Danladi	DCO NPF IDDO		08034621533			
25	Berky Bakre	Berky G. Bakre & Assoc. Ltd		08033244535			

**WULMO VILLAGE STAKEHOLDERS MEETING OF SAT. OCT 17, 2020**

ATTENDANCE SHEET - PROPOSED A. A. RANO NIGERIA LIMITED'S ABUJA ATK DEPOT AT AVIATION VILLAGE, AMAC, ABUJA FCT STAKEHOLDERS' CONSULTATION

S/NO	NAME	ADDRESS	ORGANIZATION /COMMUNITY	TELEPHONE	E-MAIL	REMARKS	SIGN/DATE
1	Sule Sarti	Wulmo Village	Wulmo Village	09023119969			[Signature] 17/10/2020
2	Abu Mubaila	Wulmo Village		87837625866			[Signature] 17/10/2020
3	Usman Acharege	Wulmo Village		08136844122			[Signature] 17/10/2020
4	Sadiq Acharege	Wulmo Village		08101987964			[Signature] 17/10/2020
5	Basiru Acharege	Wulmo Village		08022604855			[Signature]
6	Umar Dagi	Wulmo Village		08033624062			[Signature]
7	Lami Sule	Wulmo Village		07013088191			[Signature]
8	Sani Abiyi	Wulmo Village		07069498145			[Signature]
9	Usman Yahya	Wulmo Village					[Signature]
10	Abdulrazak Isah	Wulmo Village					[Signature]
11	Yakubu Acharege	Wulmo Village		08127052573			[Signature] 17/10/2020
12	Musa Salihu	Wulmo Village		07055966415			[Signature]
13	Jacob Kzi	Wulmo Village		08037035806			[Signature]

## **APPENDIX D**

### **SOCIO-ECONOMIC AND ECOLOGICAL SURVEY QUESTIONNAIRE FOR THE PROPOSED ATK DEPOT PROJECT AT AVIATION VILLAGE, ALONG NNAMDI AZIKIWE INTERNATIONAL AIRPORT ROAD, ABUJA MUNICIPAL AREA COUNCIL (AMAC), ABUJA FCT**

----- Pages 1-6

**SOCIO-ECONOMIC AND ECOLOGICAL SURVEY QUESTIONNAIRE FOR THE PROPOSED ATK DEPOT PROJECT AT AVIATION VILLAGE, ALONG NNAMDI AZIKIWE INTERNATIONAL AIRPORT ROAD, ABUJA MUNICIPAL AREA COUNCIL (AMAC), ABUJA FCT**

Date of interview-----

Name of interviewer-----

**A) RESPONDENT IDENTIFICATION**

Name: ----- Religion: ----- Age: -----

Community: ----- Sex: ----- Occupation: -----

Tick one

Head of Household Name: ----- [ ] M [ ] F

Size of the Household: ----- [ 1-5] [6-10] [11-12]

**B) SOCIO-ECONOMIC SURVEY**

**1. Settlement:**

(a) How long have you been living in the community:

[ ] Less than 10 years

[ ] Less than 20 years

[ ] Over 20 years

(b) Give reasons why you move into the community:

[ ] Nature of area

[ ] Family

[ ] Livestock grazing

[ ] Fishing

[ ] Other (specify)

(c) How do you characterize your home stand

[ ] Permanent

[ ] Temporary

**(2) SOURCES OF INCOME**

(a) How do you classify yourself?

- Employed
- Never employed
- Retired/Retrenched
- Other (specify) -----

(b) What is your main source of income?

- Agriculture (Specify type)
- Trading
- Artisanship
- Hunting
- Fishing
- Transportation
- Other (Specify) -----

(c) If you engage in farming, what are the pressing issues?

- Lack of fertilizer
- Poor Soil
- Lack of land
- Lack of market
- Low rainfall (drought)
- Pest
- Lack of funds
- Lack of equipment
- Flooding

**3) Water Resources**

**a) Indicate the source of potable water**

- Well
- Stream
- Borehole
- others (specify) -----

b) Do you think there is enough water in your area for livestock?

- yes
- No
- Fair enough

**4) Community's Problems**

- a) What do you think is the main problem in your area?
- Lack of land
  - Lack of health facilities
  - Flood
  - Lack of schools
  - No grazing area for livestock
  - Accessibility of water
  - No good road
  - Too many people
  - others (specify) -----
- b) Do you have schools in your area?
- Yes
  - No
- c) How many schools are in your area? Differentiate between Govt.- owned and others.
- 1 - 5 (Govt. – owned: ----- Others: -----)
  - 6 – 10 (Govt. – owned: ----- Others: -----)
  - above 10 (Govt. – owned: ----- Others: -----)

**5) Education of the Respondent**

- a) What is the level of education?
- Illiterate
  - Literate but no formal education
  - Primary education
  - JSC/SSC
  - under graduate
  - Professional (Doctor, Engr, LLB, MBA e.t.c.)
  - Technical (Diploma/IT).
- b) Do you have any Tertiary Institution located within your area?
- Yes; if Yes indicate types (University -----, Poly ----, Vocational -----)
  - No
- c) If yes , how many are within the area?
- 1 - 5 (University -----, Poly ----, Vocational -----)
  - 6 – 10 (University -----, Poly ----, Vocational -----)
  - above 10 (University -----, Poly ----, Vocational -----)

**6) HEALTH**

A) Hospital

a) Do you have any hospital in your area?

[ ] yes

[ ] No

b) If Yes, how many?

[ ] 0 – 5

[ ] 6 – 10

[ ] above 10

c) Are they government owned or private

Government:

[ ] 1 - 5

[ ] 6 – 10

[ ] above 10

Private:

[ ] 1 -5

[ ] 6 – 10

[ ] above 10

**7) ECOLOGICAL SURVEY**

1) Fishery Issues

a) Do you engage in fishery?

[ ] Yes

[ ] No

b) If yes, for what reason?

[ ] Commercial reason

[ ] Subsistence reason

[ ] Other (Specify) -----

c) What is the common fishing method used?

[ ] nets

[ ] poisoning

[ ] Baskets

[ ] Fishing traps

[ ] Other (Specify) -----

**8) RECREATIONAL & HISTORICAL CENTRES**

a) What types of recreation places are within your community? Give number of each.

[ ] Cinemas -----

[ ] Gardens/Parks -----

[ ] Clubs -----

[ ] Others -----

[ ] Non

b) What types of historical heritage places are within your community? Give number of each.

[ ] Museum -----

[ ] Others -----

[ ] Non

**8) OTHER ISSUES**

a) What is your attitude to the operation of Petroleum Products Tank Farm in your area?

[ ] Acceptable -----

[ ] Non acceptable -----

[ ] Don't Care -----

[ ] Don't Know -----

b) What are your concerns about the operation of Petroleum Products Tank Farm in your area?

[ ] Safety (Specify) -----

[ ] Environmental (Specify) -----

[ ] Health (Specify) -----

[ ] Economic (Specify) -----

[ ] Cultural/Life Style (Specify) -----

[ ] Other (Specify) -----

[ ] Don't Know -----

**c) Do you have any suggestions for more acceptable operation of Petroleum Products Tank Farm in your area?**

**Suggestions please:** -----

-----  
-----  
-----