



FEDERAL MINISTRY OF ENVIRONMENT

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ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMEnv/EA/EIA/6063/Vol.1/160
5th October, 2021

The Managing Director,
Indorama Eleme Fertilizer & Chemicals Limited,
Indorama Complex,
Eleme,
Rivers State.

**RE: ENVIRONMENTAL IMPACT ASSESSMENT (EIA): SCOPING WORKSHOP FOR THE
PROPOSED "IEFCL-TRAIN 3 PROJECT (AMMONIA AND UREA PLANT)"**

Please refer to the Ministry's letter ref: FMEnv/EA/EIA/6063/Vol.1/68, dated 5th August, 2021 and your letter ref: IEFCL-TR3/ENV/FMEnv/2021/03, dated 10th September, 2021 on the above subject.

2. Following the evaluation of the revised Terms of Reference (ToR) and Scoping workshop report submitted, I am directed to inform you to proceed to the next stage of the EIA process in line with Best Practices.
3. In addition to the ToR and sampling frame submitted, I am further directed to inform you to include the use of Climate Smart Technology in the scope of the EIA study.
4. Please note that the data gathering and laboratory analysis exercises shall be witnessed by officials of the Ministry. The laboratory analysis of the samples must be carried out in a FMEnv accredited Laboratory. You are also to ensure full Quality Assurance/Quality Control (QA/QC) measures for the laboratory analysis in line with standard practices and notify the Ministry in good time to enable adequate participation in the exercise.
5. The following should be forwarded to the Federal Ministry of Environment before submission of the draft EIA report.
 - i. Evidence of accreditation of the Federal Ministry of Environment for the Laboratory where the sample analysis would be carried out.
 - ii. Chain of Custody for the samples collected
 - iii. Certificate of Analysis duly stamped and signed by the Laboratory Manager.
 - iv. Evidence of Laboratory analysis witnessing by the Federal Ministry of Environment.
6. Upon completion of the EIA studies, you are required to submit to the Ministry, Ten (10) hard and two (2) electronic copies of the draft EIA report and also email a copy to eia@ead.gov.ng
7. Thank you for your co-operation.


Engr. Gomwalk, Celestine W. G.
For: Honourable Minister

**TERMS OF REFERENCE
(TOR)**

INCLUDING

SCOPE OF EIA STUDTIES

FOR

**THE PROPOSED IEFCL-TRAIN3 PROJECT
ELEME, RIVERS STATE**

SUBMITTED TO

**FEDERAL MINISTRY OF ENVIRONMENT
HEADQUARTERS, MABUSHI, ABUJA, NIGERIA**

BY

**INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED
ELEME, RIVERS STATE, NIGERIA**

SEPTEMBER 2021

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1.0 TERM OF REFERENCE (TOR)

1.1 INTRODUCTION/BACKGROUND INFORMATION

Indorama Eleme Fertilizer & Chemicals Limited (Proponent) requires an Environmental Impact Assessment (EIA) of the proposed IEFCL-Train3 (Ammonia and Urea) Project. The Project will be located within precincts of the newly acquired 250 Hectares of Land in Eleme Local Government Area, Rivers State, Nigeria. The Land is bordering Existing Indorama Complex on East side. The Proponent wishes to ensure that the Project is carried out fully in-line with National and International legislative requirements, including World Bank/IFC standards and Indorama's HSE policy statements. These standards include a requirement to assess the Environmental, Social and Health impacts of any development, so that adequate control measures can be undertaken to mitigate negative effects and enhance positive impacts. The environmental assessment will be conducted prior to commencement of the development phases. For Environmental Impact Assessment (EIA) of the proposed Project, primary data by way of baseline data collection for the Physio-biological, Social and Health environmental components become necessary for the EIA process. The Federal Government of Nigeria developed an Environmental Impact Assessment Procedural Guidelines as blueprint to protect the environment from accelerated growth in the country. The aspirations of the Guideline are to ensure that possible and potential effects (positive and negative) of any developmental project are determined prior to commencement of the Project activities and mitigation measures shall be proffered/implement during Project execution.

1.2 PROPONENT

The proponent of the proposed Project is Indorama Eleme Fertilizer & Chemicals Limited, Eleme, Rivers State, Nigeria.

It is the proponent's intent to establish the Ammonia and Urea Plants, and required associated facilities, from the concept to design and to engineering, and construction in- line with the National Guidelines on manufacturing sector.

1.3 PROJECT DESCRIPTION

The proposed Project involves setting up of Ammonia and Urea Plant, which will use Natural Gas (NG) as raw material to manufacture Granular Urea. The proposed Project scope also covers the construction of associated facilities required for seamless operation. The proposed production capacity is 2300 MTPD of Ammonia and 4000 MTPD of Granular Urea.

Ammonia Plant

Natural gas is used as feed and fuel in Ammonia plant. The Carbon of hydrocarbon converts to Carbon Dioxide (CO_2) and goes to Urea Plant. Hydrogen from the hydrocarbon and Nitrogen from the added air are used to synthesis Ammonia which is fed to Urea Plant. Ammonia Plant process steps are illustrated below.

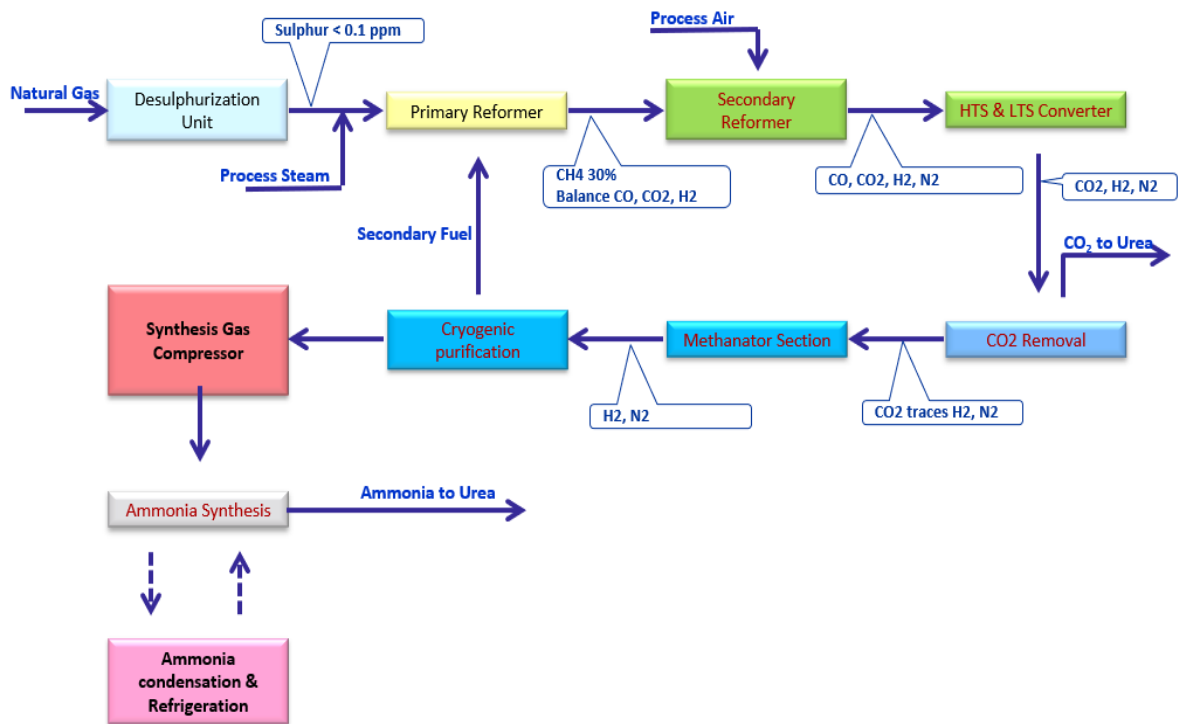


Figure 1: Ammonia Block flow diagram

Urea Plant

The Urea Plant will receive Ammonia and Carbon Dioxide from the Ammonia Plant and convert it into Urea Granule as schematically illustrated below.

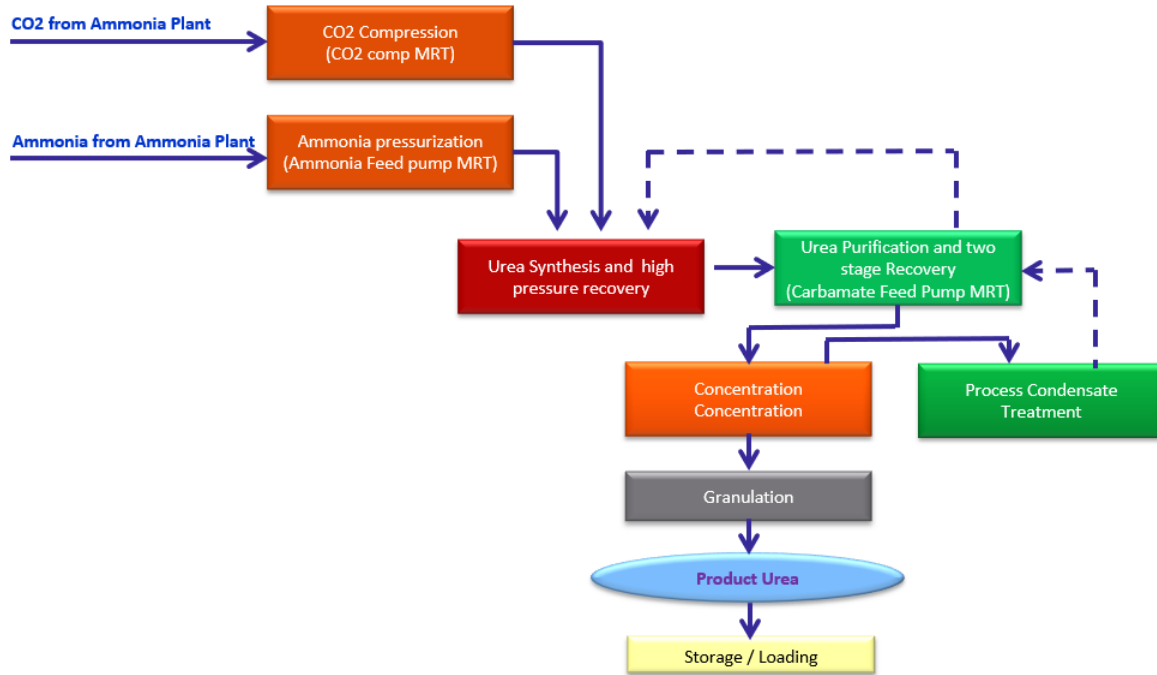


Figure 2: Urea Block flow diagram

1.4 PROJECT LOCATION

The Project, which is defined as the construction of Ammonia and Urea Plant, the main manufacturing facility, and the required associated facilities, will be sited within precincts of the newly acquired 250 Hectares of Land, which is adjacent to the existing Indorama Complex. Geographically, it is situated within North (Latitude) 4°49'15', 4°49'33", 4°50'44", 4°50'51" and East (Longitude) 7°06'16", 7°06'29", 7°06'43", 7°07'25" in Eleme Local Government Area, Rivers State, Nigeria.

Figure 3 illustrates project site; Figure 4 is the map of Eleme local Government area showing project site and figures 5 and 6 are administrative map of Rivers State showing position of Eleme LGA and Administrative map of Nigeria showing position of Rivers State respectively. A sampling map of the study area that will indicate geo-referenced sample stations will be attached, in the EIA Report.

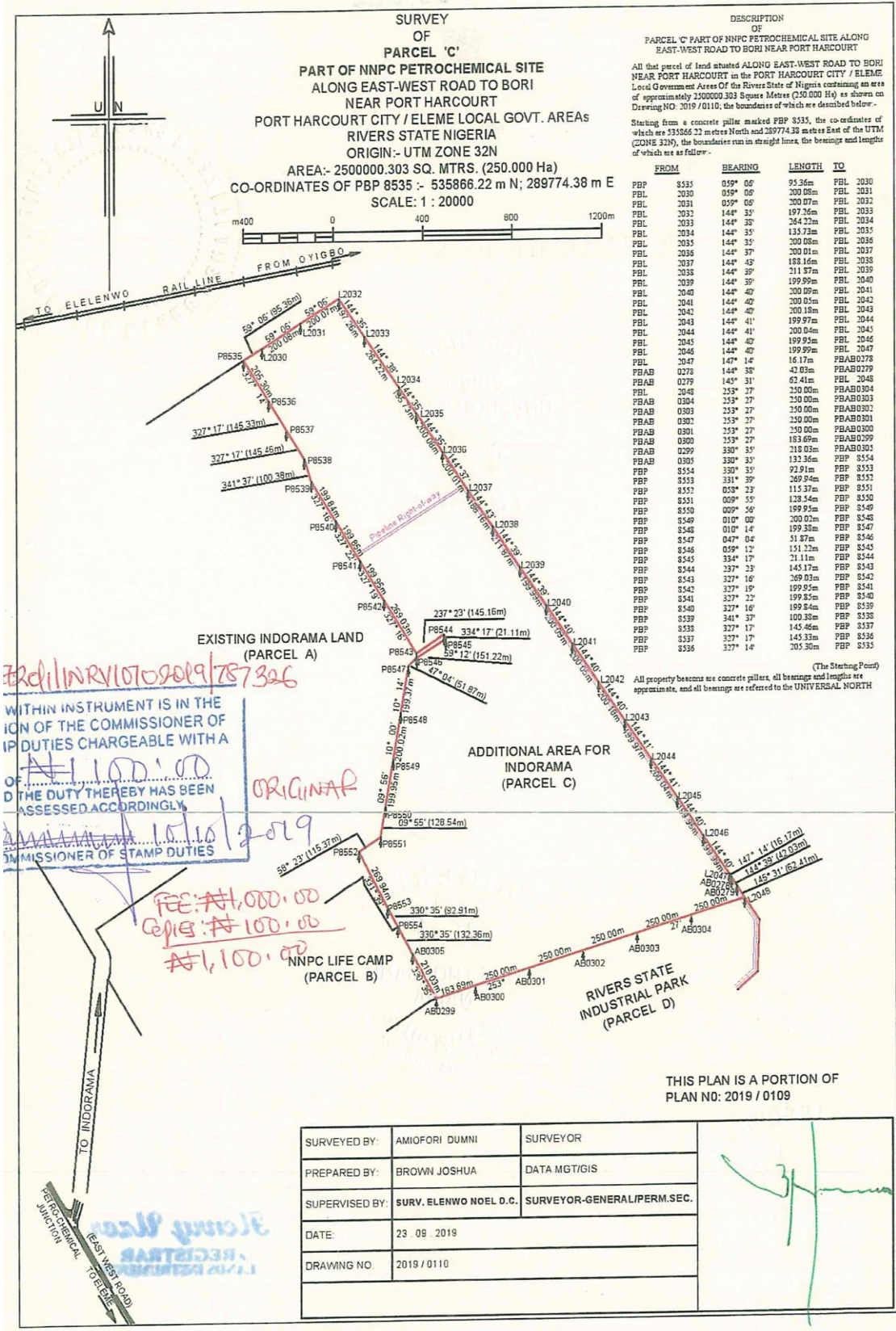


Figure 3: Project Site

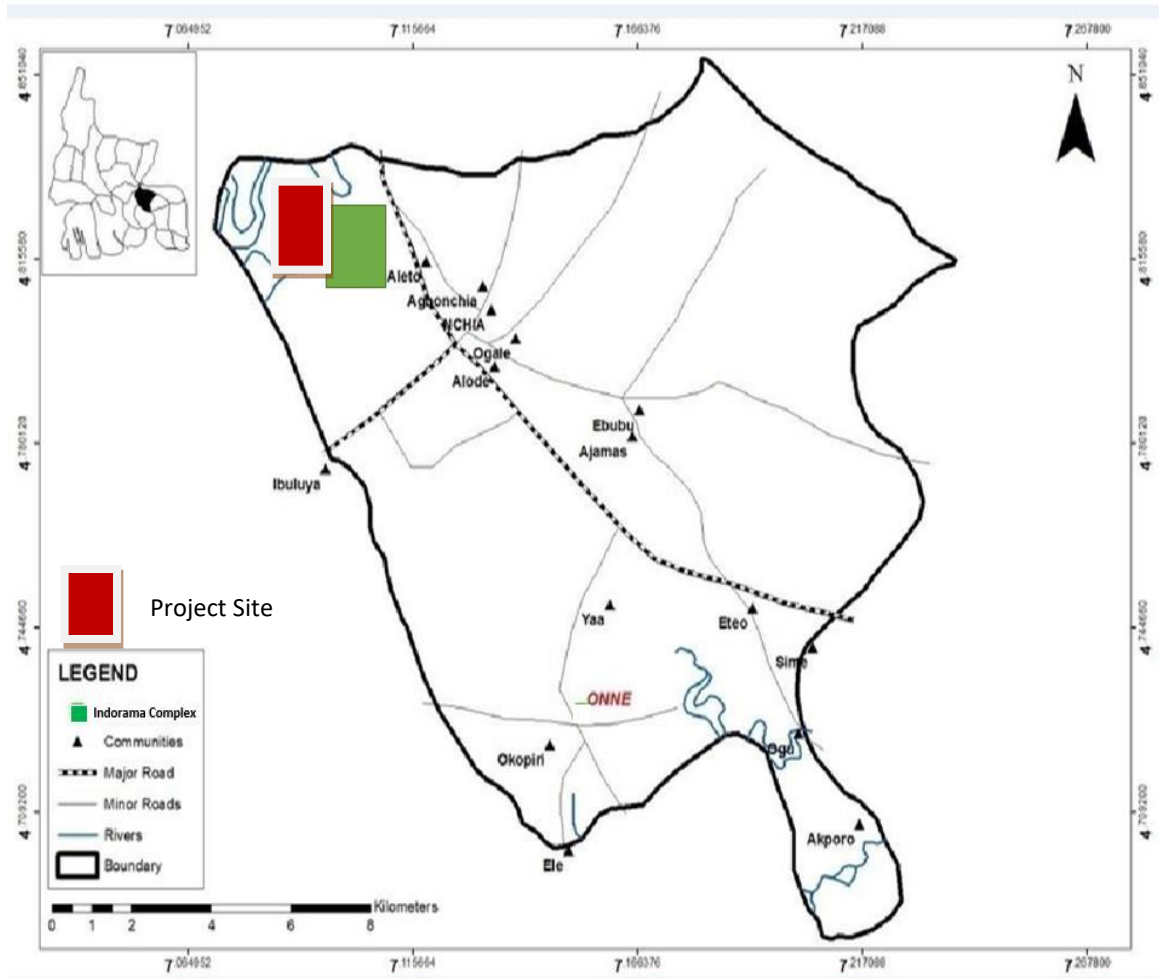


Figure 4: Map of Eleme LGA showing Proposed Project Location

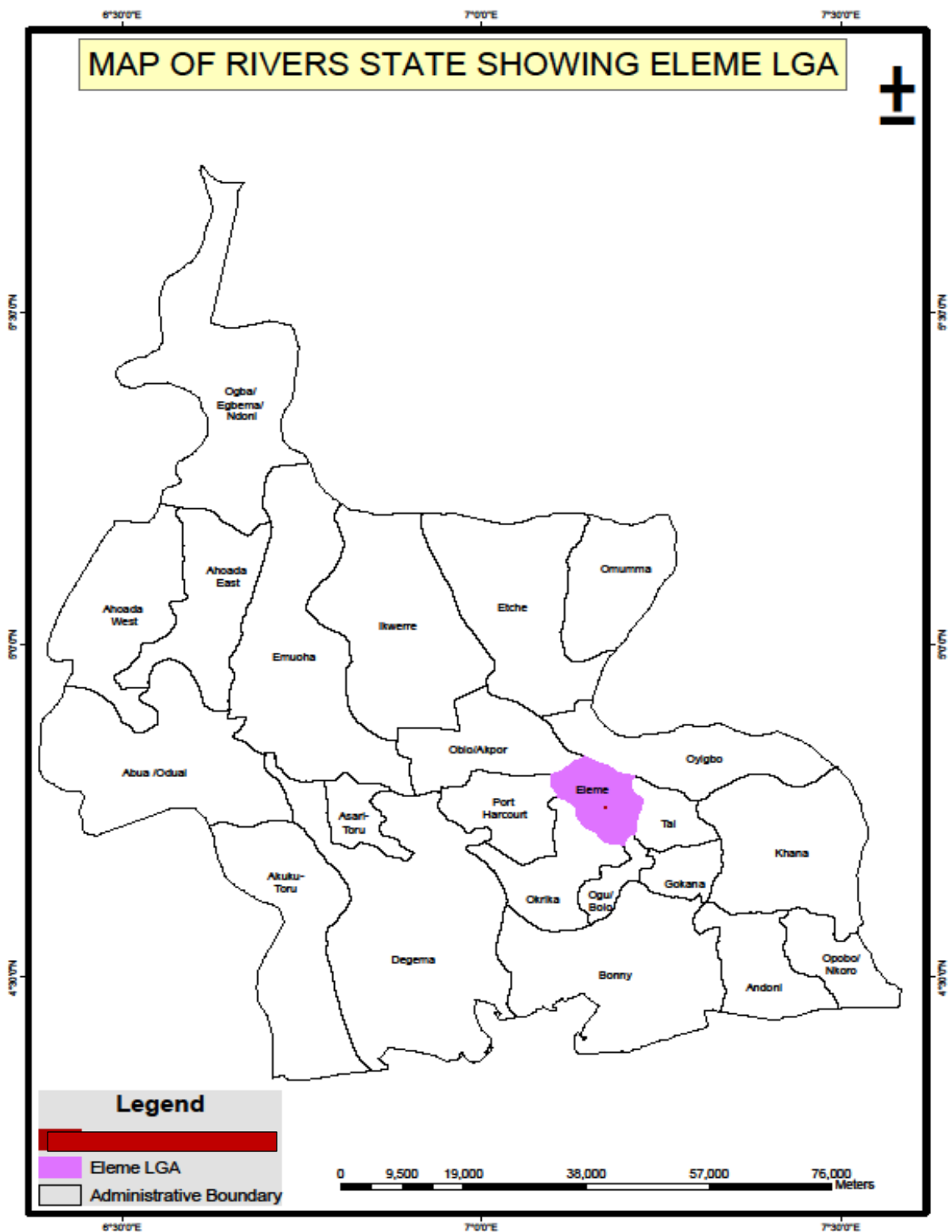


Figure 5: Map of Rivers State showing Eleme LGA

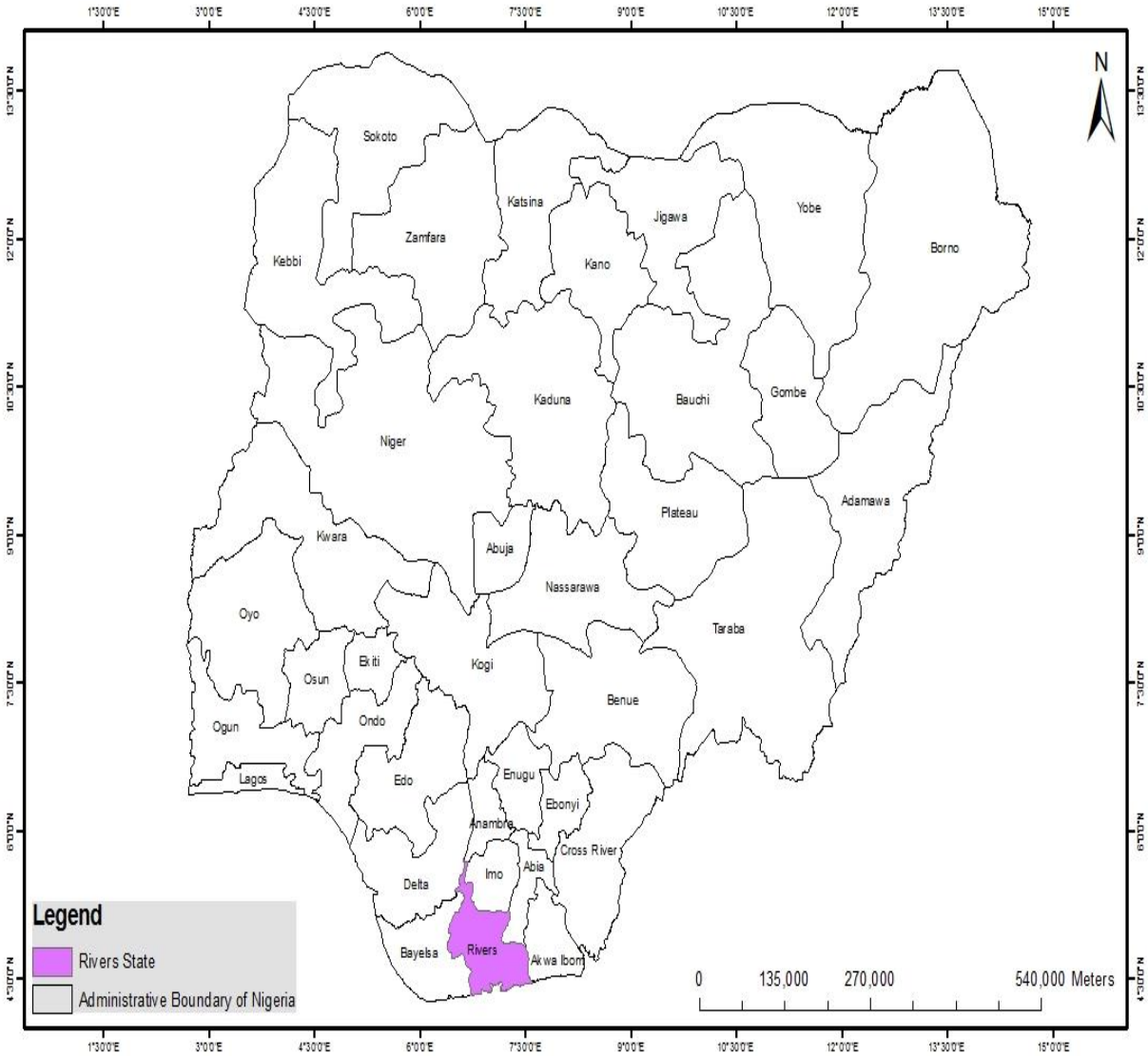


Figure 6: Map of Nigeria showing Rivers State

1.5 PROJECT REGULATORY FRAMEWORK (LEGAL AND ADMINISTRATIVE)

Several regulations exist to regulate developmental activities (oil and gas, manufacturing, mining, infrastructure, etc). These regulations are derived from International, National and State sources. The regulations from International and National sources are general in nature and applicable all over Nigeria, whilst the State regulations are specific and only applicable to project/activities within the State. Law and Regulations which control and regulate this Project will be reviewed and documented.

1.6 LEGAL BASIS FOR ENVIRONMENTAL PERMITTING

Environmental planning and permitting in Nigeria as are related to this Project is carried out through the provisions of environmental legislation.

Federal Regulations/Guidelines

- The Environmental Impact Assessment (EIA) Act CAP LFN E12, 2004
- EIA Procedural Guidelines, 1995, Federal Environmental Protection Agency (Now Federal Ministry of Environment), Nigeria
- EIA Sectoral Guidelines, Manufacturing Industry, 1995, Federal Environmental Protection Agency (Now Federal Ministry of Environment), Nigeria
- National Environmental Protection (Effluent limitations) Regulations (S.1.8), 1991
- National Environmental Protection (Pollution Abatement in Industries producing waste) Regulations (S.1.9), 1991
- National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations (S.1.15), 1991
- National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 25, 2007 and all its relevant Regulations
- Environmental Guidelines and Standards for the Petroleum Industry in Nigeria, Department of Petroleum Resources (DPR), (revised Ed.) 2018
- Mineral Oils Safety Regulations, Department of Petroleum Resources, 1997
- The Petroleum Act CAP P10, LFN 2004
- Factories Act CAP F1 LFN 2004
- Land use Act CAP L5 LFN 2004
- NSITF Employee's Compensation Act 2010

State Regulations

- Rivers State Noise (Control) Edict, No. 20, 1985
- Rivers State Environment and Development Planning Authority Edict, 1998
- Rivers State Forestry Law, 1998

- Rivers State Land Use (Environmental Degradation/Protection) Charge Law, 2005
- Rivers State Waste Management Law, 2012
- Rivers State Interim Guidelines and Standards on Environmental Pollution Control and management, 2013
- Rivers State Environmental Protection & Management Law, 2019, 15 Vol 55.

Relevant International Conventions, Guidelines and Standards

- International Union for Conservation of Nature and Natural Resources (IUCN) Guidelines, 1996
- United Nations Framework Convention on Climate Change (UNFCCC), Earth Summit, Rio de Janeiro, 1992 and Paris Agreement, 2015
- Convention on Biological Diversity (Rio Summit) 1992
- Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal, 1989
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987
- United Nations 2030 Agenda for Sustainable Development Goals, UN Sustainable Development Summit, 2015
- World Bank Guidelines on Environmental Assessment, 1991
- The Equator Principles, 2020
- Environmental and Social Framework, World Bank Group (WBG) /International Finance Corporation (IFC), 2018
- Environmental and Social Review Procedures, WBG / IFC, 2012
- Environmental, Health and Safety (EHS) Guidelines, World Bank Group (WBG) /International Finance Corporation (IFC), 2007

2.0 PURPOSE OF THE EIA

The purpose of the EIA study is to determine the current environmental conditions of the area where the Project will be sited prior to the commencement of the Project activities. This is to:

- Identify the Physio-chemical and Biological indicators that would enable effective monitoring of change in the quality of the Project area environment and
- Provide a document that can be used in predicting and evaluating impacts of the proposed development on the environment.

2.1 SCOPE OF WORK

The scope of work shall include the following:

- Determination of the physiobiological, social baseline conditions of the study area.
- Conducting an assessment and identifying the effect of this Project on the existing environment.
- Advise on the mitigation of significant adverse effects of the Project developmental phases and accompanying operations.
- Propose an Environmental Management Plan (EMP) for continued monitoring of the environmental components during the life span of the project from the time of commissioning to decommissioning.
- Preparing an acceptable report and facilitate its approval by the appropriate regulatory agencies.

To achieve above scope of work, the field data gathering campaign would be used to characterize/complement existing data on the:

- Ambient air quality and Noise status of the environs.
- Baseline status of the Surface and Groundwater, Soil, Sediment, Vegetation, Wildlife and Aquatic ecosystem in the immediate vicinity of the Project.

- Baseline Socio-economic and Health conditions in the surrounding communities, with which Project will interact.
- Existing Waste Management practices in the area.

2.1.1 FIELDWORK ACTIVITIES

The activities to be performed in the field is summarized in Table 1 below.

Table 1: Field Activities

S/N	Environmental Components	No. of Sampling Stations	Description of Sampling Equipment/Instrument	No of samples
1	Ambient Air Quality	22+2 control	Digital In-situ measurement meters shall be used	24
2	Noise	22+2 control	Digital In-situ measurement meters shall be used	24
3	Soil	22+2 control	Samples will be collected at two depths namely Top-soil (0 – 15cm) and Sub-oil (15 – 30cm)	24
4	Meteorology	1	A weather station will be set up	1
5	Surface Water	4+2 control	Sampling will be done using grab sampler, homogenised, and shall be collected in plastic bottles for physiochemical parameters, glass bottle for heavy metals fixed with HNO ₃ , glass bottles for O&G/hydrocarbons fixed with H ₂ SO ₄ and in-situ meter for in-situ measurements.	6
6	Sediment	4+2 control	Use of Eckman grab sampler	6
7	Treated Effluent Stream	4	Sampling will be done using plastic bottles for physiochemical parameters, Glass bottles for heavy metals fixed with HNO ₃ and in-situ meter for in-situ measurement	4

S/N	Environmental Components	No. of Sampling Stations	Description of Sampling Equipment/Instrument	No of samples
8	Stack Emission measurement	6	Using isokinetic sampling methodology and flue gas analyser for point source emission	6
9	Aquatic Biology	4+2 control	Water filtering, sediment sieving fisheries histology	6
10	Ground water	11+2 control	5 from existing borings and 3 from new borings at Project Site	13
11	Vegetation	8 Transect	2 points each of 2km and 4km radius & 4 transects	Use of transects
12	Wildlife	8 Transect	Hunters' interviews, animal droppings and other clues will be used	Use of transects
13	Socio-economics	6	Structured questionnaire administration,	6 Communities
14	Health Assessment	6	Survey at each community for portable water, waste disposal, health care system etc	6 Communities
15	Waste Management	Entire Project site including nearby settlements	Interviews, Questionnaire, visits to waste generation /disposal sites within 2km radius	--
16	Pollutant dispersal modelling	New Stacks	Using screening and AERMOD model	New Stacks

2.2 RECONNAISSANCE VISIT

Reconnaissance visits are carried out to prepare this scope of work. Visits provided the overview of existing infrastructure and status in the proposed Project environs, which is helpful in determination of sampling locations, preparation, and execution of this work plan.

3.0 PRE-MOBILIZATION ACTIVITIES

Several preparatory activities would be undertaken to assure the success of fieldwork. These activities are highlighted in the following subsections.

3.1 JOB HAZARD ANALYSIS

Job hazard analysis (JHA) shall be conducted before mobilisation for field activity and the JHA will be documented and communicated to all team members. The JHA document shall contain specific mitigation measures for each identified hazard.

3.2 PREPARATION OF SAMPLE CONTAINERS

All sample containers shall be prepared before mobilisation in accordance with Federal Ministry of Environment (FMEEnv) and Department of Petroleum Resources (DPR) Control and Assurance procedures.

3.3 WORK PLANNING MEETING

At least one work planning meeting shall be conducted before the mobilisation date to provide ample opportunity for team members to understand their responsibilities, communication protocols, logistics arrangements etc. The JHA and mitigation measures designed for the identified hazards shall also be discussed during the meeting(s).

3.4 PRE-MOBILIZATION CHECKS

Pre-mobilisation checks/inspections (kick off meeting) shall be conducted by Proponent's QA/HSE officers to confirm that every necessary material and equipment needed for the field work is available and functional. During the checks, equipment calibration certificates, medical certificates and other evidence that demonstrate that materials, equipments, and personnel are ready for mobilisation shall be confirmed.

3.5 FIELD SAMPLING EQUIPMENT AND MATERIALS

Sampling equipments and materials that shall be used for this field data gathering campaign are listed in table 2 below.

Table 2: Field Data Collection Equipments/Materials

EQUIPMENTS/MATERIALS	USE
Digital Camera	Photographs
Plastic basins/trays	Collection of sediment samples
Sieve (0.5mm)	Sieving for benthic organism
WTW Multi-Meter	Measurement of samples pH / Conductivity /Salinity/ Temperature / Turbidity / Dissolved Oxygen
Coolers	Storage of Samples
GPS meter	Determination of coordinates/positioning
Soil colour chart	Description of sediment/soil
Hand Auger	Soil sampling
2L Plastic bottles	Collection of water for physio-chemistry
1L glass bottles	Collection of water for hydrocarbon
1L glass bottles	Collection of water for heavy metals
500ml plastic bottles	Collection of filtered water for Zoo/Phytoplankton
500ml plastic bottles	Collection of sieved sediment benthos
200ml glass bottles	Collection of water for microbiology
Sampling bags	Collection of sediment/soil samples for physico-chemistry/heavy metals
60ml plastic containers	Collection of sediment/ soil sample for microbiology
100ml glass containers	Collection of sediment/ soil sample for THC
PPEs (Coverall, Hard hat, Safety shoe, Eye goggle, etc)	Sampling activities, protection for field personnel
Marker/masking tapes	Identification of sample ID
Labels	Identification of sample
Notebook and biros	Data /information logging
Forms (daily project update form & incident/hazard form)	Quality control
Sulphuric acid	Preservation
Nitric acid	
10% formaldehyde	
Conductivity/pH/turbidity standards	Quality control
Particulate meter sampler	SPM, PM ₁₀ , PM _{2.5} Measurement
Digital Sound level meter	Noise measurement
Potable Gas Analyser	Air quality measurement (SO _x , NO _x , CO, O ₃ , NH ₃ etc.)

EQUIPMENTS/MATERIALS	USE
Anemometer	Wind speed and wind direction measurements
Flue Gas analyser	Stack emission monitoring (SO _x , NO _x , CO, O ₂ etc.)
Iso-kinetic sampling train	PM analysis is stack emission
Disposal hand glove	For use when handling chemicals
25ml beaker/250ml beaker	In-situ analysis
100ml volumetric flask, pipette 10ml, 5ml	In-situ analysis
Distilled water	In-situ analysis/QC
Scoop and hand trowel	Soil/sediment sample collection
Eckman grab sampler	Collection of sediment samples
Water grab sampler	Collection of water samples
UPS	Power supply
First Aid box	Emergency treatment
Plankton net	Zoo/Phyto-plankton
Serviette	Tool cleaning

4.0 SAMPLING STRATEGY

To adequately cover the study area, the consultant shall carry out ambient air quality, noise, soil, groundwater, surface water, aquatic biology, sediment, vegetation, wildlife study at determined stations and SIA/HIA surveys in identified communities/settlements within the study area. The sampling stations will be geo-referenced.

4.1 SAMPLING LOCATIONS

In view of our knowledge of the study area it is known that all the communities and their lands in the proposed study region have similar settlement pattern, geologic, geomorphologic, hydrologic, and edaphic conditions. Therefore, homogenous features influenced the number of sampling points which are well spread in the communities. Table 3 below illustrates the environmental components to be studied in identified communities. We intend to locate sampling points within 250 Hectares of Land (Project Site), Existing Indorama Complex and in six (6) Project affected communities. Additional stations may be located depending on environmental realities on ground, during consultant's fieldwork.

Table 3: Environmental components to be studied within Host communities

S/N	Location of Sampling Stations	Environmental Components to be sampled									
		SW	AqB	GW	AR/N	MET	SL	VG	WLF	SIA	HIA
1	Project Site	-	-	√	√	√	√	√	√	-	-
2	Indorama Complex	-	-	√	√	√	√	√	-	-	-
3	Elelenwo	-	-	√	√	√	√	-	-	√	√
4	Akpajo	-	-	√	√	√	√	√	√	√	√
5	Aleto	√	√	√	√	√	√	√	√	√	√
6	Agbonchia	√	√	√	√	√	√	√	√	√	√
7	Nguru	-	-	√	√	√	√	√	√	√	√
8	Okerewa	-	-	√	√	√	√	√	√	√	√

Key:

SW = Surface Water
 AqB = Aquatic Biology
 GW = Ground Water

AR/N	=	Air/Noise
MET	=	Meteorology
SL	=	Soil
VG	=	Vegetation
WLF	=	Wildlife
SIA	=	Socio-economy
HIA	=	Health

4.1.1 AMBIENT AIR QUALITY & NOISE MONITORING / SOIL SAMPLING STATIONS

In this study, twenty-four (24) sampling stations are proposed for Ambient Air Quality & Noise Monitoring and Soil sampling. The proposed twelve (12) locations are within 2km radius and ten (10) within 2 to 4km radius from the centre of Project site. Two (2) controls stations are proposed, which are within 4 to 10km radius from the centre of Project site. The sampling locations and tentative coordinates are presented in below table 4. A sampling map showing locations and real-life coordinates of all sampling stations will be attached with EIA Report.

Table 4: Ambient Air Quality & Noise Monitoring / Soil Sampling Stations

Station	Location	Tentative GPS Coordinates	
		North (N)	East (E)
X1	West end of the Project site (New Plot)	4°50'42.20"	7°06'18.00"
X2	North End of the Project Site (New Plot)	4°50'48.80"	7°06'29.00"
X3	Between North & East End of the Project Site (New Plot)	4°50'08.60"	7°06'57.60"
X4	East End of the Project Site (New Plot)	4°49'30.00"	7°07'26.00"
X5	South End of the Project Site (New Plot)	4°49'16.80"	7°06'43.50"
X6	Centre of the Project Site (New Plot)	4°50'5.30"	7°06'49.70"
X7	Flare area of Indorama Complex	4°49'54.20"	7°06'37.00"
X8	ETP Area of Indorama Complex	4°49'32.20"	7°06'30.50"
X9	Down-wind of Urea Warehouse within Indorama Complex	4°50'25.20"	7°05'49.80"
X10	Vegetation area towards North of the Project Site (New Plot)	4°50'45.50"	7°07'35.80"
X11	IRC within Indorama Complex	4°50'10.70"	7°05'27.00"

Station	Location	Tentative GPS Coordinates	
		North (N)	East (E)
X12	Main gate of Indorama Complex (Close to East-West Expressway)	4°48'47.00"	7°05'52.00"
X13	Agbonchia Community	4°48'20.00"	7°07'31.60"
X14	Aleto Community	4°48'40.00"	7°06'09.80"
X15	Akpajo Community	4°49'44.50"	7°05'17.60"
X16	Elelenwo Community	4°50'15.00"	7°04'43.00"
X17	Steel Market	4°51'10.00"	7°05'01.60"
X18	Axis of Iriebe Market	4°51'45.00"	7°05'47.00"
X19	Axis of Iriebe area	4°52'09.00"	7°06'58.00"
X20	Between Edutex and farming settlement	4°50'14.50"	7°08'53.50"
X21	Nguru Community	4°48'14.65"	7° 07'13.96"
X22	Okerewa Community	4°48'22.77"	7° 06'26.71"
CX1	GSS - Oyigbo	4°52'43.00"	7°08'23.00"
CX2	Rumuokwurusi	4°50'23.00"	7°03'32.00"

In meteorology, the World Meteorological (WMO) Standard for linear Projects is to use surface distance and latitudinal variance not greater than 150km to locate weather stations. Such data is normally augmented with long – term weather data from synoptic stations. In this study we have reduced the distance so that we capture climatological conditions in the communities and business centres within four (4) km radius of the Project.

4.1.2 SURFACE WATER / SEDIMENT / AQUATIC BIOLOGY SAMPLING STATIONS

In this study, six (6) sampling stations are proposed for Surface water & Sediment sampling and Aquatic biology study. The proposed four (4) locations are located on Okulu River which is within 4km radius from the centre of Project site. Two (2) controls stations are proposed, which are within 4 to 10km radius from the centre of Project site. The sampling locations and tentative coordinates are presented in below table 5.

A sampling map showing locations and real-life coordinates of all sampling stations will be attached with EIA Report.

Table 5: Surface water / Sediment / Aquatic Biology Sampling Stations

Station	Location	Tentative GPS Coordinates	
		North (N)	East (E)
SW1	Agbonchia stream (Near Road Bridge)	4°48'28.00"	7°05'26.00"
SW2	Agbonchia stream (Near Pipeline ROW)	4°48'27.00"	7°06'39.00"
SW3	Aleto stream (Near E-W Expressway Bridge)	4°48'26.00"	7°06'06.00"
SW4	Aleto stream (Near NNPC housing)	4°48'30.00"	7°05'24.00"
SWC1	Rumuokwurusi stream	4°50'24.00"	7°03'37.00"
SWC2	Imo River (Near Imo Gate)	4°53'14.00"	7°08'44.00"

4.1.3 GROUNDWATER SAMPLING STATIONS

In this study, eight (8) sampling stations are proposed for Groundwater study. The proposed three (3) locations are located within precincts of Project site and three (3) locations within 4km radius from the centre of Project site. Two (2) controls stations are proposed, which are within 4 to 10km radius from the centre of Project site. The sampling locations and tentative coordinates are presented in below table 6. A sampling map showing locations and real-life coordinates of all sampling stations will be attached with EIA Report.

Table 6: Groundwater Sampling Stations

Station	Location	Tentative GPS Coordinates	
		North (N)	East (E)
GW1	Within Indorama complex (In-front of Off-site control room)	4°50'04.50"	7°06'30.50"
GW2	Axis of Iriebe area	4°51'51.00"	7°06'47.00"
GW3	Agbonchia Community	4°48'12.00"	7°07'04.00"
GW4	Aleto Community	4°48'40.00"	7°06'09.80"
GW5	Akpajo Community	4°49'44.50"	7°05'17.60"
GW6	Elenwo Community	4°50'15.00"	7°04'43.00"
GW7	Nguru Community	4°48'14.65"	7° 07'13.96"
GW8	Okerewa Community	4°48'22.77"	7° 06'26.71"
GW9	Within precincts of Project Site (New Plot)	within North (Latitude) 4°49'15', 4°49'33", 4°50'44", 4°50'51" and	
GW10			

GW11		East (Longitude) 7°06'16", 7°06'29", 7°06'43", 7°07'25"	
GWC1	Rumuokwurusi	4°50'31.00"	7°03'38.00"
GWC2	Ogale	4°47'54.00"	7°07'05.00"

4.1.4 TREATED EFFLUENT STREAM SAMPLING STATIONS

In this study, four (4) sampling stations are proposed for treated effluent stream study. The proposed four (4) sampling locations are ISBL treatment effluent pit of IEFCL-Train1 and IEFCL-Train2, Holding Pond and Retention Pond Sluice Gate. The sampling locations and coordinates are presented in below table 7. A sampling map showing locations and coordinates of all sampling stations will be attached with EIA Report.

Table 7: Treated Effluent Sampling Stations

Station	Location	GPS Coordinates	
		North (N)	East (E)
Eff1	IEFCL-Train1 ISBL Pit	4°50'22.33"	7°06'08.72"
Eff2	IEFCL-Train2 ISBL Pit	4°50'23.64"	7°06'08.71"
Eff3	Holding Pond	4°49'30.79"	7°06'23.60"
Eff4	Retention Pond Sluice Gate	4°49'25.73"	7°06'20.52"

4.1.5 STACK EMISSION MONITORING

In this study, six (6) sampling stations are proposed for stack emission monitoring. The proposed six (6) stack monitoring are of IEFCL-Train1 and IEFCL-Train2 operating plants. The sampling locations and coordinates are presented in below table 8. A sampling map showing locations and coordinates of all sampling stations will be attached with EIA Report.

Table 8: Stack Emission Monitoring Stations

Station	Location	GPS Coordinates	
		North (N)	East (E)
SE1	Primary Reformer - 1	4°50'55.52"	7°05'58.71"
SE2	Package Boiler - 1	4°50'63.44"	7°05'59.80"
SE3	Urea Granulator - 1	4°50'52.50"	7°05'56.42"
SE4	Primary Reformer – 2	4°50'17.40"	7°06'16.00"
SE5	Package Boiler – 2	4°50'21.20"	7°06'15.40"
SE6	Urea Granulator - 2	4°50'27.30"	7°06'10.70"

4.2 SUMMARY OF SAMPLE PONITS

The proposed total number of samples per environmental component are illustrated in below table 9.

Table 9: Total number of Sampling Stations

S/N	Environmental Sphere	No of Sample points
1	Ambient Air	24
2	Noise	24
3	Soil	24
4	Meteorology	1 met station
5	Surface Water	6
6	Sediment	6
7	Aquatic Biology	6
8	Groundwater	13
9	Treated Effluent Stream	4
10	Stack Emission Monitoring	6
11	Vegetation	8 Transect
12	Wildlife	8 Transect
13	Socio-economy	6
14	Health Assessment	6

4.3 ASSOCIATED AND POTENTIAL IMPACT ASSESSMENT

Associated and potential impact assessment of the proposed project will be carried out using internationally acceptable assessment methods. Arising from above, impacts will be categorized into qualitative and quantities criteria to bring out beneficial, negative, short term, long term, reversible, irreversible, cumulative etc impacts. These impacts will be ranked to see how low, medium, and highly sensitive the impacts are.

5.0 EIA STUDIES

5.1 POSITIONING AND PHOTOGRAPHING

All sample points shall be geo-referenced using a handheld GPS meter with WGS 84 geographic settings, while features of interest shall be recorded on digital photography.

5.2 METHODOLOGIES FOR EIA STUDIES

5.2.1 METEOROLOGY

In this study we intend to adopt the locational and community standard to carry out the met study. One met station will be located within the Indorama Complex to enable the collection of micro data over a 24-hour period. This will be augmented with data collected from synoptic stations/Indorama's continuous monitoring Met Station.

5.2.2 AMBIENT AIR QUALITY/NOISE MEASUREMENT

The ambient air quality parameters (SPM, PM10, PM2.5, NOx, SOx, CO, NH₃, O₃ and HC) shall be measured at twenty-four (24) designated stations using portable gas analysers and a mini-volume sampler. Ambient noise levels shall be measured at the same stations. Noise levels shall be measured using Digital sound level noise meter.

The ambient air quality parameter and Noise measurements shall be carried out in the field over a period of One (1) hour at each monitoring station and hourly average shall be recorded.

5.2.3 WATER SAMPLING

Surface water sampling shall be conducted on the Okulu (Aleto) River with the aid of appropriate grab water sampler. Okulu River is the only surface water body within 4km radius of the Project site. Two control samples shall be collected from the Imo River and Rumuokwurusi Stream, which are located within 5 to 10km radius of the Project site.

Groundwater samples shall be collected from thirteen (13) stations, one each from Indorama Complex, Iriebe axis, Agbonchia, Nguru, Okerewa, Aletto, Akpajo, Elemenwo; three (3) from the Project site and two (2) control samples from communities located at East & West side within 4 to 10km radius of the Project Site. This report shall be complemented with results from the geotechnics report.

Treated Effluent Stream samples shall be collected from four (4) stations. The proposed four (4) sampling locations are ISBL treatment effluent pit of IEFCL-Train1 and IEFCL-Train2, Holding Pond and Retention Pond Sluice Gate.

Generally, upon collection of water samples, in-situ measurement shall be carried out for conductivity, temperature, salinity, pH, dissolved oxygen, and turbidity. Samples shall afterwards be sub sampled into recommended bottles and preserved for transfer to laboratory for further analysis. The laboratory shall be FMEnv approved and will have the Proponent's approval.

5.2.4 SEDIMENT SAMPLING

Sediment samples shall be collected at the surface water sampling points with the aid of an Eckman grab sampler. Upon collection, samples shall be visually inspected and relevant physical information logged into the field notebook. Sub samples shall be collected and appropriately preserved for laboratory analysis.

Benthos – Samples for benthic macro-fauna characterization shall be sieved through a 0.5mm mesh and residue shall be transferred into plastic containers for storage. The study of the aquatic biology component of the Project area will aid in making scientific judgements on the productivity potentials of the aquatic ecosystems.

5.2.5 PLANKTON SAMPLING

Zoo and Phytoplankton samples shall also be collected at all surface water stations. The plankton net shall be towed along a horizontal path at the surface of water for

minimum 5 minutes and retrieve to deck for phytoplankton samples collection. Zooplankton sampling shall be accomplished by towing the net in a vertical position. Sampling of planktons shall be carried out in day light only.

Phytoplankton: Samples shall be collected using 250ml polyethylene bottles and preserved by addition of 5ml Lugol's solution. The bottles shall be pre-cleaned and rinsed with distilled water.

Zooplankton: Samples shall be collected using 250ml polyethylene bottles and preserved by the addition of 10% formalin. The bottles shall be pre-cleaned and rinsed with distilled water. All samples collected shall be identified in accordance with FMEnv identification procedure and shall be stored in sample coolers.

5.2.6 SOIL SAMPLING

Soil sampling stations shall be designated across the study area. Soil samples shall be collected with a hand auger at the depth of 0-15cm (Top-soil) & 15-30cm (Sub-soil). Minimum 1kg of soil sample shall be taken. Collected samples shall be properly homogenised and non-matrix particles removed before sub sampling into pre-cleaned containers for laboratory analysis.

After each use, the hand auger shall be cleaned by brush. All samples collected shall be identified in accordance with FMEnv identification procedure and shall be stored in sample coolers.

5.2.7 STACK EMISSION MONITORING

The isokinetic sampling method is used for sampling of particulate matter, where the gas was sucked isokinetically and particulate matter collected in pre-weight glass-microfiber thimble. The total particulate matter is gotten by the difference in weight of the thimble before and after collection over a known time. To analyze ammonia, standard acid is used as absorbent, the gas is passed on a fixed flow rate for a

particular time. The concentration was determined through a back titration with 0.2N-NaOH. The gas volume is normalized by temperature and pressure correction, and ammonia calculated in mg/Nm³. For analysis of Nitrogen Oxides (as NO₂) and Sulphur Oxides (as SO₂) Madur 21 Plus instrument or equivalent instrument is used and then the measured values in ppm are converted to mg/Nm³.

5.2.8 VEGETATION STUDIES

The Project area, which is localized around Akpajo-Aleto-Agbonchia lands is made up of mixed tropical rain forest of matured Rain Forest and Fresh water Rain Forest. The area has mainly secondary vegetation, farmlands, and fallow lands with small area of climax vegetation within four (4) km radius of the Project Site. The vegetation studies shall use standard ecological methods and will be based on quadrants. Photographs shall be used to document vegetation cover characteristics of the study area. Studies shall also involve interview with knowledgeable local people who will assist in the identification and valuation (economic, medicinal, cultural, etc) of plants species.

5.2.9 WILDLIFE STUDIES

Wildlife studies shall be carried out mainly through interviews with relevant people of nearby communities. The local markets shall also be surveyed to identify wildlife species that are on sale and obtain information on their occurrence in the area. Field activities would include inspection and observation of wildlife spoor, feeding and nesting ground, feathers, nests, holes, etc.

5.2.10 HYDROGEOLOGY AND GEOPHYSICAL INVESTIGATIONS

The geology and hydrogeology will be described to include major drainage basins, developments, transportation systems, etc in the study area.

This will enhance ascertaining the relationship between surface and subsurface water bodies, flow directions, lithology, and stratigraphy of the underground layers. These will aid in determining the possibility of physical propagation of pollutants.

Two (2) types of ground water will be studied. Water of the upper unsaturated zone and true ground water flowing in the lower zone.

Water levels will be measured in all wells during sampling. Spot heights at each sampling point will be determined to aid in producing groundwater flow.

Lithology and water quality determinations will be logged to aid detailed interpretation of the resistivity data.

5.2.11 WASTE MANAGEMENT

A comprehensive study of waste generation sources, types and disposal practices shall be conducted within the study area. A waste management plan will be drawn, to determine if any cumulative impact is possible during construction and operation phase of the Project.

5.2.12 LAND USE

The existing land use pattern in the Local Government Area hosting the Project will be studied. This shall be related to the various land uses and zoning in the study area (residential, commercial, business, recreation, forest reserve etc).

5.2.13 SOCIO-ECONOMIC

Socio-economic assessment of the communities located within four (4) km radius of the Project site and other communities deemed fit shall be conducted. The team will therefore cover the six (6) villages, with them Project may interact. Our socio-economist shall survey the opinion of and obtain a profile of public attitude to the proposed Project. The data will be obtained using consultations, interviews, structured questionnaire, and statistics from various agencies. Targeted groups for information would include Local Government Officials, Chiefs, Farmers, Hunters, Traders, Women groups, Youth association, non-governmental organizations, and Institutions/Governments agencies with interest on environment. The authorities at various public institutions such as hospital, utility boards, schools, the police, etc. shall also constitute major and reliable information sources.

Public forum shall be organized by the Proponent for the two (2) ethnic communities within and close to the study area. Our socio-economist shall present an environmental and social profile of the planned development to the participants/stakeholders. Results of the forum shall be adequately documented and presented as a section in the EIA Report. The Elelenwo, Akpajo, Aleto, Agbonchia, Nguru, Okerewa communities and Indorama Complex shall be sampled.

A traffic survey will be conducted on the major highway which will feed the Project.

5.2.14 HEALTH ASSESSMENT

A survey of health institutions, patent medicine stores, trade-medical and traditional treatment facilities in the study area will be conducted. The survey will also document the various and common medical conditions in the area. Risk and Hazards of the Project which may impinge on health will be documented and suggestions shall be made to prevent such risk. The Elelenwo, Akpajo, Aleto, Agbonchia, Nguru, Okerewa communities and Indorama Complex shall be surveyed.

5.3 SAMPLE HANDLING, TRACKING AND TRANSPORTATION

Prior to sampling and storage, an indelible label shall be secured to the containers identifying each sample. The label shall contain the following information:

- Sample code
- Name of sampling personnel
- Location of the sampling site
- Date and time of sampling
- Type of sample and
- Type of preservative if any

All samples collected in the field shall be adequately sealed, labelled, and recorded in the field notebook. Collected sub-samples shall be preserved in accordance with standard work instruction.

Prior to departure from the field, inventory of the collected samples shall be logged, with sample IDs and all necessary information shall be recorded in the Chain of Custody forms.

Prior to departure from our Base, all samples shall be transferred to laboratory into well protected coolers fortified with ice cubes.

Upon arrival of samples in the laboratory, the information on the Chain of Custody shall be cross-checked to confirm appropriate and adequate recording. Physical counting of the samples shall also be done. Upon confirmation of correctness of all information and deliverables, the samples shall be received by laboratory and stored appropriately for analysis. All samples will be analysed in FMEnv approved laboratory.

The detailed sample handling procedures shall be adopted for study are presented in table 10 below.

Table 10: Sample Handling Protocol

Determination	Minimum sample vol.	Container	Preservative	Container pre-treatment
Water				
Temp., pH Conductivity, DO,	Measure on site, collect 2L sample for lab analysis	Plastic or glass bottles	Cool	Rinsed with distilled water
Heavy metals	1.0L	Glass bottles	Add conc. HNO ₃ to pH <2	Rinsed with 1 + 1 HNO ₃
Oil and Grease	1.0L	Wide mouth glass bottles	H ₂ SO ₄ to pH <2, & Cool	Rinsed with solvent
Microbiology (HUF, HUB, etc)	200ml	Wide mouth glass bottles	Cool	Sterilized
TPH	1.0L	Glass bottles	Cool	Rinsed with solvent
Sediment / Soil				
Total Hydrocarbon content	100g	Plastic bags	Cool	Rinsed with solvent
Heavy metals	100g	Plastic bags	Cool	Rinsed with solvent
Microbiology (HUF, HUB, etc)	50g	Wide mouth glass bottles	Cool	Sterilized

5.4 ANALYSIS PARAMETERS

The sample matrices and the parameters to be analysed are listed in table 11 below. The Project will utilize the following laboratories located in Port Harcourt: (1) M/s Anal Concept Ltd (2) M/s Jawura Environmental Services Ltd. Both laboratories are accredited by FMEnv.

Table 11: Analysis Parameters

Matrix	Parameters
Soil	Heavy metals (Mn, V, Ni, Cr, Fe, Pb, Cu, Zn, Hg, As) conductivity, pH, moisture content, sulphide, sulphate, nitrate, phosphate, Total petroleum hydrocarbon (TPH), particle size distribution (PSD) and microbiology (HB, HUB, HF, HUF), colour, porosity, permeability
Sediment	Benthic studies, pH, temperature, sulphide, sulphates, nitrates, phosphates, heavy metals (Mg, Ag, CO, Mn, V, Ni, Cr, Fe, Pb, Cu, Zn, Hg, As), TPH, TOC, Na, Ca, K and microbiology.
Surface water	Heavy metal (Mg, Ag, CO, Mn, V, Ni, Cr, Fe, Pb, Cu, Zn, Hg, As), pH, temperature, Total Hardness, sulphates, nitrates, phosphate, ammonia, urea, chloride, conductivity, dissolved oxygen, TSS, Turbidity, THC, Biochemical oxygen demand (BOD), Chemical oxygen Demand (COD), microbiology (coliform, total plate count, THB, THF), plankton studies
Hydrobiology	Plankton (Zoo and Phyto), Benthos, Fisheries, Population, Species, Family
Groundwater	Heavy metals (Mn, Mg, Cr, Fe, Cr, Fe, Pb, Cu, Zn, Hg, Ni, Cd, As), nitrate, silica, calcium, cyanide, Na, K, Sulphate, pH, general appearance, chloride, conductivity, turbidity, TDS, TSS, Total hardness, Microbiology (Total Coliform, Faecal Coliform, total Plate count), DO, BOD, COD, HUB, HUF, THB, THF
Treated Effluent	Heavy metals (Mn, Mg, Cr, Fe, Cr, Fe, Pb, Cu, Zn, Hg, Ni, Cd, As), nitrate, silica, calcium, cyanide, Na, K, Sulphate, pH, general appearance, chloride, conductivity, turbidity, TDS, TSS, Total hardness, DO, BOD, COD,
Air quality/Noise	Suspended Particulates Matter (SPM), PM ₁₀ , PM _{2.5} gases (NO _x , SO _x , VOC, CxHy, O ₃ , CO, NH ₃) and noise
Stack Emission	Particulate Matter (PM), Ammonia, gases (NO _x , SO _x , VOC, CxHy, CO ₂ , CO, O ₂)

Matrix	Parameters
Vegetation and wildlife	Identification of rare/endanger/dominant species, species composition, relative abundance and diversity, pathological assessment, state of health
Socio-economics indices	Settlement pattern and income Population studies distribution and demography, employment status, commercial activities, occupation status of community, infrastructure, educational institution availability, culture, religion, tradition, tourism perception of communities, etc Traffic pattern/modes
Health Assessment	Medical health facilities status, major sources of receiving medical care, disease and epidemiology conditions risks and hazards of project.

5.5 LABORATORY ANALYSIS

The laboratory analytical methods to be used are presented in Table 12 below.

Table 12: Analysis Methods

Parameter	Analytical method
PHYSIOCHEMICAL	
pH	pH meter
Temperature, °C	APHA-2550-B
Electrical Conductivity, µS/cm	APHA-2510 A
Total Dissolved Solids, (TDS) mg/l	APHA-2540 C
Turbidity, NTU	ASTM D 1889
Total Suspended Solids (TSS) mg/l	APHA-2540 D
Total Hardness mg/l	APHA-2340 C
Alkalinity mg/l	APHA 2320-B
Chloride (Cl ⁻) mg/l	ASTM D512
Sulphate (SO ₄ ²⁻), mg/l	ASTM D 516
Nitrate (NO ₃ ⁻), mg/l	APHA-4500-N03-B
Phosphate (PO ₄ ³⁻), mg/l	ASTM D 515
Ammonium (NH ₄ ⁺), mg/l	APHA- 4500 F
Dissolved Oxygen (DO) mg/l	APHA- 4500-O-C
Biochemical Oxygen Demand (BOD), mg/l	APHA- 5210-B
Chemical Oxygen Demand (COD), mg/l	APHA- 5220-D
Oil & Grease mg/l	ASTM D3921

Parameter	Analytical method
METALS	
Total Iron, mg/l	ASTM D 1068
Calcium (Ca) mg/l	ASTM D511
Magnesium (Mg), mg/l,	ASTM D511
Zinc (Zn), mg/l	ASTM D 1691
Copper (Cu) mg/l	ASTM D1688
Manganese (Mn) mg/l	ASTM D858
Total Chromium (Cr) mg/l	ASTM D1687
Silver (Ag) mg/l	ASTM D3866
Lead {Pb} mg/l	ASTM D3559
Mercury {Hg} mg/l	ASTM D3223
Cadmium {Cd} mg/l	ASTM D3557
MICROBIOLOGY	
Total Coliform (cfu/100ml)	APHA 9222B
Faecal coliform (cfu/100ml)	APHA 9222B
Total plate count (cfu/ml)	APHA 9215C

6.0 PROJECT MANAGEMENT TEAM

The Project Director for this EIA study project is Mr. O.A Wai-Ogosu (Consultants Team Lead). He shall give approval to all activities/documentation made for this project before transmittance. He shall be responsible to the Proponent for all aspects of this field work/laboratory analysis and other associated activities. Regularly he will communicate project progress to Proponent through transmittance of letters/emails as stipulated in the clients request for proposal. The consultant's management team shall constantly sustain relevant information from the field through the field coordinator and shall update to him.

The key consultant personnel that shall be involved in the successful execution of this project is mentioned in below table 13.

Table 13: Consultant Project Management Team

S/N	PERSONNEL	COMPONENT/DUTIES
1	Engr. Olu Andah Wai-Ogosu	Environmental Management
2	Dr. David Edokpa	Air Quality /Noise/Climate/Meteorology
3	Solomon Nwachukwu	Soil
4	Prof. Erema Daka	Hydrobiology
5	Adewale A.	Water Chemistry
6	Raphael Offiong; Edwin Nwosu	Vegetation/Wildlife
7	Prof. T.K. Abam	Hydrogeology
8	O. Wai-Ogosu	Waste Management
9	Prof. Zabeey	Biodiversity
10	Iminabo - Austin	Social Impact Assessment
11	Iminabo - Austin	Health Impact Assessment

6.1 FIELD TEAM

The team members that would execute the fieldwork (and their responsibilities) are presented in table 14.

Table 14. Consultant Field Study Team and Responsibilities

Personnel	Designation	Responsibility
Mr. O. A. Wai-Ogosu	Project Manager	Fieldwork coordination, field observations and report writing
Adewale A.	Field Supervisor	HSE Officer /Equipments calibration / maintenance
Dr. Ed Nwosu	Ecologist	Wildlife / Vegetation
Solomon Nwachukwu	Soil Scientist	Soil
Iminabo - Austin	Socio-economist	Socio-economics survey
Dr B.O. Osaro	Occupational Health	Health Assessment
Adewale A.	Water Chemist	Surface water
Prof. T.K. Abam	Hydrogeologist	Ground water monitoring and Geotechnics
John Barikpoa, John Mbie	Technicians	Field sampling and data gathering
Samplers	Field samplers will be recruited from the communities	Field sampling and data gathering

6.2 FIELD COMMUNICATION PROCESS

The field work manager shall be responsible for decisions in the field. He will take the appropriate decision after consultation with their offices. All requests to the Proponent from the field shall be channelled through Proponent’s field representative. During execution of the filed work, the relevant information to the field team shall be cascaded through daily morning briefing meetings and details shall be forwarded to consultant office by field work manager. The line of communication is represented in below flow chart.

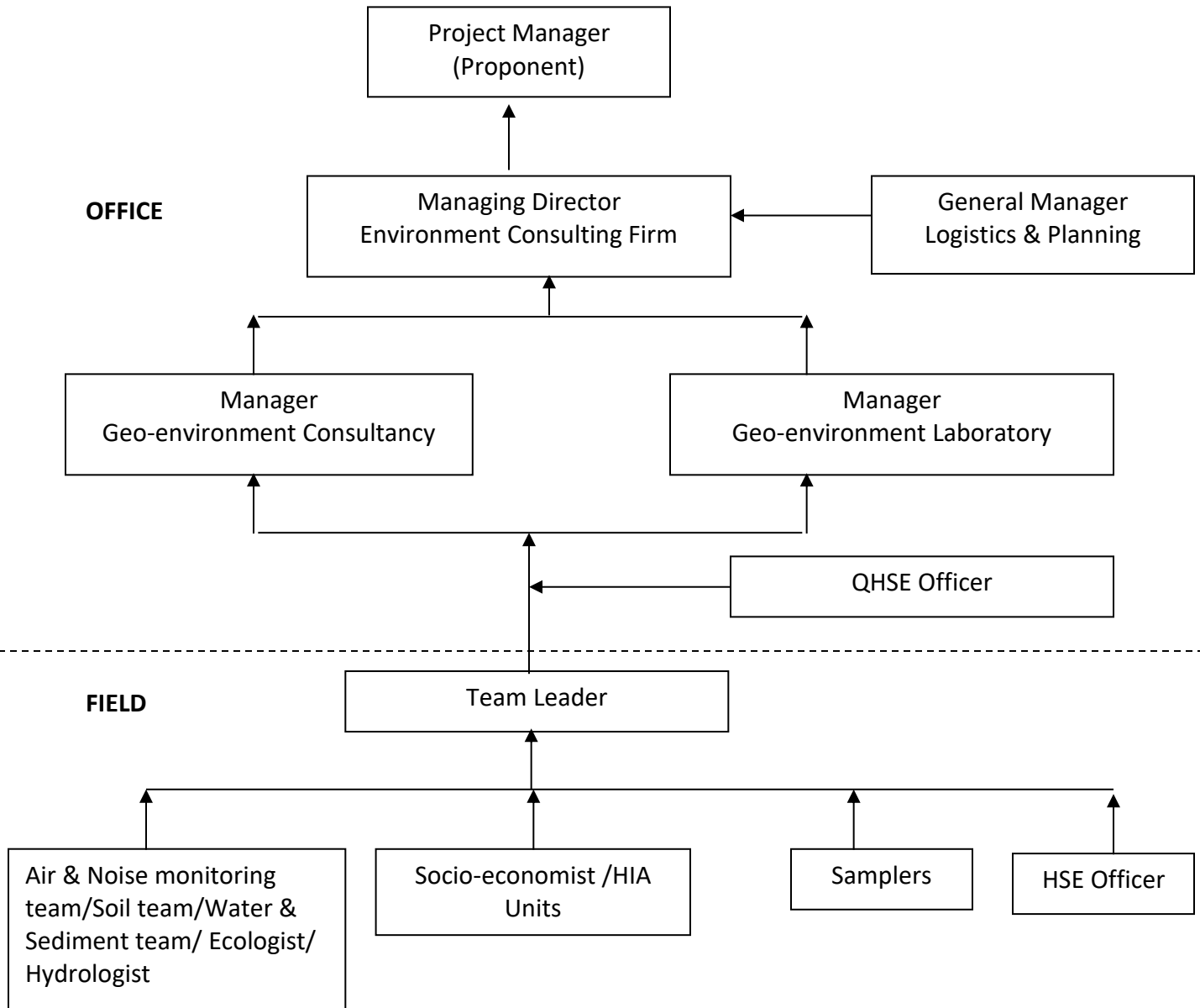


Figure 7: Communication Channel

6.3 LOGISTICS

The consultant shall be responsible for conveyance of materials and personnel from its Port Harcourt base to and from the field. The consultant shall also be responsible for the undamaged and safe delivery of the materials to the point of usage. The logistics arm of the consultant will ensure that all materials required for the effective execution of the fieldwork are delivered promptly at the point of need. Thereafter, the field sampling coordinators shall take charge of moving such equipment and material between sampling locations.

7.0 QHSE PLAN FOR FIELD ACTIVITIES

The QHSE activities/processes necessary for assuring the success of the fieldwork are outlined in this section. The implementation or use of these activities/processes are the responsibility of the indicated team members and shall be strictly supervised by the project manager/team leader in-line with the consultant's QHSE requirements. The project manager/team leader shall also maintain appropriate records of these activities throughout the fieldwork.

7.1 JOB HAZARD ANALYSIS

To ensure safe fieldwork execution, a comprehensive Job Hazard Analysis (JHA) shall be conducted before mobilisation for field activities and the JHA shall be documented and communicated to all team members during pre-mobilisation meeting. The JHA document shall contain specific mitigation measures for each identified hazard of fieldwork activities. During field work, each day these JHAs shall be discussed/communicated to all team members in morning briefing meeting.

7.2 DAILY TOOLBOX MEETING

There shall be daily toolbox (planning and safety meetings) for all fieldwork days. The project manager/team leader shall conduct the meetings before commencement of each day's activities based on pre-prepared agenda. Issues that should form part of the agenda include JHA as related to day's activities, daily work targets, review of previous day's progress and matters arising. The records of these meetings shall be maintained by the project manager.

7.3 DAILY PROGRESS REPORTING

Each field sub-team shall be required to produce and submit a daily progress report to the Project manager/Team leader. The reports shall be made-out using standard forms to be provided by the Project manager/Team leader. However, if required, additional information can be provided on plain paper. Team members shall report any significant observation or threatening situation immediately to Project manager

/Team leader. The incident/accident report forms shall be used to report all incidents/accidents (including nears misses) and copies shall be submitted to Consultant's office.

7.4 DOCUMENTATION, HANDLING AND STORAGE OF SAMPLES

Project manager/Team leader shall be provided filed notebooks to all team members. The notebooks shall be used extensively to document all field findings and observations in systematic and professional manner. The field notebooks shall remain the property of the consultant documentation. The digital cameras shall be also be provided by the Consultant to capture live photographs.

7.5 CODE OF CONDUCT

The consulting company's policies and procedures shall be followed by every team member throughout the fieldwork activities. The Project manager/Team leader shall duly inform these policies/procedures to team members during pre-mobilisation meeting. If any team member is not clear on any issues, such person shall seek explanation or interpretation from the Project manager/Team leader or any other duly authorized representative of the consulting company.

7.6 EMERGENCY PROCEDURE

It is the responsibility of each team member to familiarise himself with the emergency procedures documented by covering every area and work. In addition, emergency response issues shall form part of the daily toolbox meetings. The overall responsibility lies with Project manager/Team leader/Field coordinator to ensure that all activities are carried out safely. However, on account of an emergency the following shall be maintained.

- All work must stop at once
- All equipment in use must be shut down
- All men shall be evacuated to a pre-determined "Muster Point"

- A roll call shall be taken for head counts
- No one shall be allowed to do work of any kind until notification is given for normalcy situation.

A team member at the instance of such emergency shall be required to give adequate details of incident and minimum shall provide the details like as victim and incident details. The team members shall also alert the consultant field coordinator and proponent representative for immediate action.

Where appropriate, first aid shall be administered to victim in the field before evacuation to the hospital, if required. Evacuation of victim in such circumstance shall be done professionally and promptly. The victim shall be carried to the Consultant's Retainership clinic, as mentioned in below table 15.

Table 15: Consultant's Retainership Clinic

Name	Address	Phone Number	Contact
Princess Medicals	Port Harcourt	09062859579	Dr. Ugochukwu Mr. A. Ajai

The field coordinator is responsible to inform such emergencies to the below listed (table 16) Consulting company's Top Management Team.

Table 16: Consultant's Emergency Contacts

NAME	DESIGNATION	CONTACT
O.A. Wai-Ogosu	Managing Director	08033384134
S. Nwachukwu	Supervisor Field service /Operations	08032906022
A. Adewale	General Manager, QHSE Division	08037203989

7.7 COMMUNITY RELATIONS PLAN

The consultant will ensure the safety, health, environment, and wellbeing of the communities in all areas of operation. This is aimed at securing social liaising and

effective partnering with communities and stakeholders to ensure safe and sustained field work execution.

Therefore, the consultant is committed to:

- Consulting with communities appropriately and adequately before commencement of filed work.
- Identifying and evaluating all potential social conflicts which may arise during field activities and shall take appropriate preventive measures before commencement of the filed work.
- Complying with understanding/agreements reached with communities and
- To minimise conflicts, the team members shall be adequately briefed on the norms and socio-cultural characteristics of the work area.
- The technicians/workers required for filed activities shall be hired from relevant communities.

8.0 DEMOBILISATION

Demobilisation from field shall be confirmed by the Project manager/Team leader upon completion of objectives and targets or in the face of unacceptable risk/hazard to the team. Demobilisation shall be preceded by an audit to determine that all field objectives/targets have been achieved or that the work which is no longer safe for the team shall be continue and shall be executed at appropriate time. The logistics of demobilisation shall be arranged by the Project manager/Team leader. All samples shall remain in the custody of the Consultant's laboratory personnel who shall ensure that the samples are handled and transported in-line with Consulting company's quality control requirements. Upon arrival at the Consultant office in Port Harcourt, custody of all samples shall be transferred to Laboratory manager.

8.1 EIA SCHEDULE

The EIA shall be conducted in accordance with FMEnv protocols. A tentative schedule is illustrated in below table 17.

Table 17: EIA Work Schedule

Description	Duration (Weeks)
Mobilisation and Demobilization	2 Weeks
Logistics and planning	1 Weeks
Literature Review	2 Weeks
Field data gathering (Two Seasons)	4 Weeks
Laboratory analysis of samples	4 Weeks
Preparation of Draft EIA Report	12 Weeks
Review of Draft EIA Report by the proponent	2 Weeks
Preparation of final Draft Report (on receipt of Proponent comments)	1 Weeks
Review of report by Regulatory Agencies & Public Display	6 Weeks
Panel review and Harmonized comments on the draft EIA Report	4 Weeks
Preparation of Final Report	2 Weeks
Gross Total	40 Weeks

- Adherence to these timeframes is subject to prompt provision of project technical information as may be requested from time to time.
- Progress Report shall be submitted in accordance with the EIA TOR and Contract Agreement throughout the duration of the project.

8.2 DELIVERABLES

- I. Mobilisation/Field Report, 1 hard copy + Soft Copy : Proponent
- II. Data Report, 2 hard copies + Soft Copy : Proponent
- III. Draft EIA Report, 15 hard copies + Soft Copy : Proponent, FMEnv
- IV. Final EIA Report Incorporating Comments, : Proponent, FMEnv
10 hard copies + Soft Copy

9. EIA REPORT FORMAT

The EIA report writing format shall follow the protocol mentioned in Environmental Impact Assessment – Procedural Guideline, 1995, Federal Environmental Protection Agency (Now Federal Ministry of Environment), as detailed below.

- i. Title page
- ii. Table of contents
 - a. Chapters, their titles and pagination
 - b. List of maps, illustrations, and figures
 - c. List of tables
 - d. List of acronyms and abbreviation
 - e. List of EIA preparers
- iii. **Executive Summary**
- iv. Acknowledgement
- v. **Chapter One** – Introduction - Background information, Administrative and Legal framework, Terms of reference, Declaration
- vi. **Chapter Two** – Project Justification - Project Background, Project Objectives, need for the Project, Value of the project, envisage sustainability, alternatives considered (including no Project alternative), development options considered, site selection.
- vii. **Chapter Three** – Project description - Type of project, scope, location, material input/output and by products, waste generation, technical layout and process, operation and maintenance, Project schedule.
- viii. **Chapter Four** – Description of the physical and social environment - Study approach, literature review, baseline data acquisition method and QA/QC, geographical location, field data, climatic conditions, air quality assessments, noise level assessments, vegetation cover characteristics, potential land use and landscape patterns, ecologically sensitive areas, terrestrial fauna and wildlife, soil studies, aquatic studies including hydrobiology and fisheries, groundwater resources, socio-economic and health studies, prediction of

changes in the baseline condition without the development in place, consultation – identification of stakeholders, consultation with regulators, consultation with communities, community concerns and observations, and Participatory Rural Appraisal (PRA).

- ix. **Chapter Five** – Associated and Potential Environmental Impacts - Scoping, Impact prediction methodology, significant positive and negative impact of the Project activities (site preparation, construction, transportation, impacts). Impacts on resource utilization, process impacts (operation) short/Long term effects, reversible/irreversible effects, cumulative effects, direct/indirect effects, adverse/beneficial effects, social effects, health effects, risk, and hazard assessment (HAZOP, HAZID, QRA) etc.
- x. **Chapter Six** – Mitigation Measure and alternatives - control technology, compensation, alternative site, alternative technology, compliance with health and safety hazards requirements.
- xi. **Chapter Seven** – Environmental Management and Community Development Plans - Guidelines for specific project activities, emergency response procedures, mitigation plan, costing of alternatives and budgets requirements, monitoring program (scope, parameters, frequency, location, methodology), auditing and inspection procedures, waste handling procedures, training program, roles, and responsibilities, decommissioning plan etc.
- xii. **Chapter Eight** – Conclusion and Recommendations
- xiii. Bibliography/Reference
- xiv. Appendices

10. REGULATORY INTERFACE

Consulting company shall provide regulatory interface services to ensure that the EIA study meets regulatory requirements and approved timely. Regulatory interface will cover.

- Approval of EIA Terms of reference
- Participation of regulators in field data gathering exercise, laboratory analysis and stakeholder's forum
- Technical review of EIA reports with regulators.

PROCEEDINGS OF THE SCOPING WORKSHOP ORGANIZED
FOR
IEFCL-TRAIN3 & PDH-PP PROJECTS

DATE : 20th August 20210

VENUE : Swiss Spirit Hotel, Ken Saro Wiwa Road, Port Harcourt, Rivers State

PRESENTER : Engr. Andah Olu Wai-Ogosu (Consultant)

The workshop commenced at about 10:25 am with introduction of participants which include the following stakeholders:

1. Representatives of the Federal Minister of Environment
2. Representatives of the Ministry of Environment, Rivers State
3. Host communities
4. Eleme Fishing Association
5. Eleme Hunters Association
6. Eleme Youth Leaders
7. Eleme Women Leaders
8. Members of Project Advisory Committee (PAC)
9. The King of Eleme
10. Paramount Rulers of various Communities in Eleme
11. The Chairman, Eleme LGA
12. The Leader, Eleme Legislative Assembly
13. The Consultant to Indorama, Prof. Andah Olu-Wai Ogosu
14. The Indorama Team

Total 89 attendees in scoping workshop and the attendance sheet is appended as annexure 1.

Presentation of Scope of the EIA on the proposed Projects

Indorama's Environmental Consultant first informed the participants about the Proponents and background of the projects before diligently reviewing the Scope of the EIA work which covered description of the project and the physiobiological content of the components of the environment of the study area. He claimed that the EIA study would cover 4km radius and six

(6) host communities. He also emphasized that the study would cover socio-economic variables, Occupational and normal Health Status of the project area, Transportation, and waste related issues, associated and potential (positive and negative) impacts of the proposed projects during construction and operations phases of the project implementation. He did not leave out the report format, deliverables and necessary management plans which will enhance the value of the projects not only on the community resources but also on the economy of the local, State and Federal Government. He closed by stating that the EIA study will be carried out with reference to National and International Environmental Regulations. The presentation made to stakeholders is appended as annexure 2.

QUESTIONS AND COMMENTS

1. Engr. Fubara of FMEnv

Considering the huge traffic that will be generated from the Train-3 project, what are the implementation strategy to resolve the anticipated traffic problem, and the strategy for economic resettlement considering the likely impact of the operation on the people's source of livelihood.

2. Hon. Dick Nwosu

Advised that refreshment be provided for participants of the workshop.

3. Chief Emaa Jaka. He asked for the implementation strategy for the huge traffic problem that will be created. He also observed that the anticipated overpopulation problem is not captured in the presentation. He also wished to know plans for ecological restoration following the effects that the project will have on the ecosystem.

The presenter responded by saying that over-population is captured under what he described as social variables, which accounts for migrant workers and its management. He also emphasized that ecological related problems are duly treated under biodiversity plans.

Mr. Kendrick Oluka, General Manager Community and Governance Affairs, the moderator of the workshop representing Indorama, also explained the plan put in

place by the company for traffic management. That a traffic management park is been developed supervised by Hon. Nwosu. Also, that severally the company has assisted the government in road rehabilitation to reduce bad spots on the road which is also responsible for heavy traffic on the road. Also, that the company has severally made presentations to both State and the Federal government on the state of the Eleme-Onne Road. He also directed attention to the Rivers State Government's plan to construct a link road (MTECH road) connecting the Airport, through Agbonchia to Onne. All these plans will help to ease traffic in the proposed project area.

4. Mr. Joseph Ekehe representing Agbonchia

He commended the excellent presentation and Indorama as a responsible company. He expected to hear more on the dangers and environmental challenges associated with the project. He appealed that an environmental expert should be engaged to interface between the community and the company for better understanding of the benefits that will be derived from the projects.

A respondent from the community reacted that they will not be need for another external environmental expert since their own son, the presenter, an expert in environmental studies is the one handling the projects. That, he will be consulted privately, whenever the need arises.

5. Barrister Wordi

He complained on the non-implementation of the previous traffic management plans and that what is the guarantee that all the traffic management plans contained in the present EIA will be implemented. He advised the consultant to follow-up on the plans to ensure all that are stated in the report are implemented. He also suggested that an advanced copy of the presentation should be sent to stakeholders before the workshop for subsequent meetings to enable participants / non-professionals participate and flow along with the presenter.

6. Rev. Oluji Joseph, representing Fishermen Association of Eleme

He expressed worry over the negative impact that harmful emissions have had on aquatic life, and wished to know the mitigation plans, alternative source of livelihood to fishermen if their fishing business is affected by the operation, and alternative source of drinking water for the people.

The presenter reacted to most of the questions by drawing their attention to the purpose of the workshop for the day, which is to define the scope of the projects, and to get inputs that will enrich the study from the various stakeholders and not to be discussing hazards. And that in subsequent meetings other areas of concern will be addressed through direct interaction with the various groups.

7. Elder Igolo, representing Hunters Association

He appealed that Indorama as part of their CSR should provide the following for the communities: potable drinking water, job opportunities, electricity, and pipeline surveillance contract. He also advised the company to roll out a robust environmental plan for the preservation of wide-life and biodiversity.

8. Hon. Victor O. Goka

Commended the consultant and the company for always giving EIA lectures before commencing their projects. He also advised the company to take necessary precautions on the inherent environmental hazards associated with the projects. He also emphasized the need for regular meetings with relevant stakeholders so that they can make inputs as the study progresses. He praised Indorama for creating jobs and contracts for Eleme people and encouraged more investments from Indorama in Eleme to create more employment opportunities.

REACTIONS FROM THE HIGH TABLE

1. Representative of the Federal Minister of Environment

He commended the excellent presentation. Emphasized the need for inclusion of the fishery issue raised in the study. He advised that sampling locations for air quality, soil and groundwater should be spread across all the communities in the

study area to avoid any issue coming from any community after the study have been carried out.

2. Representative of the Rivers State Minister of Environment

He expressed confidence in the expertise of the consultant. He appealed for cooperation among the various stakeholders (community, company, and consultant). He advised that concerns raised in previous EIAs (implementation of environmental management plan) should be incorporated into the present EIA. He also emphasized on the need to incorporate safety and effluent discharge as key components in the EIA study. Worried about his observation during one of his visits to the facility on workers concept and poor safety behavior. He appreciated the cordial relationship between the company and the community, stressing that Indorama is a responsible company, and advised them to sustain the good relationship.

3. The Honourable Chairman, Eleme Local Government Area

He appreciated all that are present at the workshop. Advised that if the impacts of previous plants on health, economy and other areas are high, they should consider relocating the current plant. He appealed that more of this kind of investments should be sited in the area because of its economic benefits. He encouraged the planting of trees now as a long-term plan to mitigate the impacts of the operation on the environment. The Chairman advocates for the establishment of an Environmental Trust Fund to foster development. Finally, he appreciated the efforts and expertise of the consultant and that his expertise will be needed by the community instead of hiring someone else.

4. The Royal Majesty, the King of Eleme Kingdom-King Dr. Philip Obele

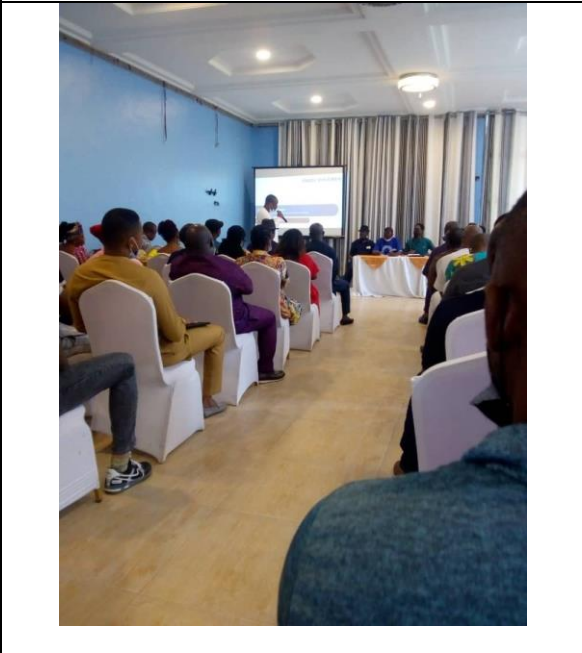
The king appreciated all for being present at the workshop. He stated that any place that is industrialized must always have problems of pollution and over-population. He encouraged all to expect that, but the challenges associated with it must be managed. What is most important is the development that comes with industrialization. He identified one source of traffic in the area as those coming

with their private trucks to present them for hire by those doing business in Indorama complex. He further assured every one of the environmental safety considerations incorporated into the design of the plants from inception, of which he was part of the team that carried out due diligence on the company in India. He advised the Eleme people to embrace Indorama with good heart as there are other people who might be interested in them to avert relocation to other areas and states hotly itching for development.

Conclusively, the scoping workshop went well, and stakeholders participated actively to enrich the Scope of the EIA study work. The stakeholder's inputs are incorporated in revised Scope of Work (SOW)/ Terms of Reference (TOR) for both the Projects.

EVENT PHOTOGRAPHS





INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA
&
INTEGRATED POLYCHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA
ATTENDANCE SHEET

PROJECT	IEFCL-Train3 and PDH-PP PROJECTS
DATE & TIME	20 TH AUGUST, 2021. 10 AM
VENUE	SWISS SPIRIT HOTELS & SUITES, NO. 79 STADIUM ROAD, PORT HARCOURT, RIVERS STATE.
TOPIC	SCOPING WORKSHOP

S/N	NAME	COMMUNITY/ ORAGNIZATION	PHONE NUMBER	EMAIL	SIGN
1.	HON. NWOSU NLETA (PP)	ALETO PAC	0803874807		
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4	WESI, VICTOR D.	MUNDO HU	08038897223		
5	Nwaka Nwafor	AKPakpan PAC	08104065296		
6	PHILIP (HON) GEORGE ESALO	AGBONITA PAC	0818422544		
7	Hon. Osaro Sampson Yorgba	Okereusa PAC	08064860580		
8	Philemon Oji Obek	AKPAJO PAC	0803276587		
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11	Chf. Mgbigbi Osilocher	Okereusa PAC	08132113292		
12	H# Emere Esu Xoyan	N.I. 2019	07031322305		
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14	(Emere) Osato A. Nwafor	AKPAKPA PAC	08033397185		
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19	MRS Florence Aji ^{WOMAN}	AGBONCHIA	080398686920		Chika
20	Edith Osaramube ^{WOMAN}	AGBONCHIA	0813535722		Chika
21	NNE S. Sogbo ^{WOMAN}	ALETO	07034259691		Chika
22	BLOSSING CYRUS ^{WOMAN}	OKEREWA	08199122191		Chika
23	Olare Chinwi Amadi ^{WOMAN}	ALETO	09156096484		Chika
24	NWIDAA N. MARITA ^{YOUTH}	AKPA JO	08034409354		Chika
25	heeky N. Chima ^{YOUTH}	AKPA JO	07046495107		heeky
26	Osambou Blessing ^{YOUTH}	AGBONCHIA	07072651240		Chika
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31	SOCOMOSI ORELE ^(YOUTH)	AKPA JO	08160225760		Chika
32	JOSHUA Omute N. ^(YOUTH)	OKEREWA	07035834935	President	Chika
33	IKOMAH, F-B	FMEUV.PIT	0855662496		Chika
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41	Wisdom Nwaji	ALGO	08131937874	
42	Chief Emee Jaka	Alpgo	07062795211	
43	Johnzon Gombanwafu	AKPAPA	07068692505	
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46	R. O. OKPARA	Agbonchin	08060318855	
47	Wilcox Henry Chinnah	Nwaku	08032651672	
48	Joseph Skee	Agbonchin	08038067118	
49	TUMI, DUMBARI K	RSMENY	08038731185	
50	ELIGR EBOMIANU F.S.B	FRENCH	08035533263	
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52	Comd Deri T. Ogoru	omma	07065846581	
53	Comd. Afeys Saeed	Ncha youth	08030858762	
54	Comr. OJINJA A. OBAR	ODI OYOKA	08039525229	
55	MAGNUS ALVIN OSARONWAFU	AKPAJO	09055881159	
56	Barinua Barikpoa	E & CS Ltd	08070442580	
57	Nachukwa Solomon	E & CS Ltd	0802906022	
58	Zorka Sunday	E & CS Ltd	07037993486	
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77	PRINCE OKEREKE	ALSTO	08037753397	ELEME YOUTH PRESIDENT	
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FEDERAL MINISTRY OF ENVIRONMENT

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Tel: 09-2911 337 Email: ea@ead.gov.ng, www.ead.gov.ng

ENVIRONMENTAL ASSESSMENT DEPARTMENT


FMENV/EA/EIA/6063/Vol. 1/190
3rd December, 2021.

The Managing Director,
Indorama Eleme Fertilizer & Chemicals Limited,
Indorama Complex,
Eleme,
Rivers State.

**FEEDBACK OF THE WET SEASON BASELINE DATA GATHERING & LABORATORY ANALYSIS
WITNESSING EXERCISES FOR THE ENVIRONMENTAL IMPACT ASSESSMENT OF THE
PROPOSED IEFCL - TRAIN 3 PROJECT (AMMONIA AND UREA PLANT) AT ELEME, RIVERS
STATE HELD ON THE 18TH - 21ST OCTOBER, 2021 BY INODRAMA ELEME FERTILIZER &
CHEMICALS LIMITED**

Please refer to the Data Gathering and Laboratory Analysis Exercises conducted for the above project which was witnessed by an official of the Ministry on the 18th - 21st October, 2021.

2. Following the conclusion of the Baseline Studies, I am directed to convey the Ministry's approval to proceed to the next stage of the EIA process.
3. The following should be forwarded to the Federal Ministry of Environment on or before submission of the Draft EIA Report;
 - i. Evidence of accreditation of the Federal Ministry of Environment for the Laboratory where the samples analysis would be carried out.
 - ii. Chain of custody
 - iii. Certificate of Analysis duly stamped and signed by the laboratory Manager.
 - iv. Evidence of Laboratory witnessing by the Federal Ministry of Environment.
4. Consequently, you are to submit Ten (10) hard and Two (2) electronic copies of the Draft Environmental Impact Assessment (EIA) Report and also mail a copy to eia@ead.gov.ng.
5. You may contact the undersigned on GSM number 08037869670 or Mr. Ladula H. D. on 08020910889 for further clarifications.
6. Thank you for your cooperation.


Engr. Gomwalk, Celestine W. G.
For: Honourable Minister



FEDERAL MINISTRY OF ENVIRONMENT

Environment House

Independence Way South, Central Business District, Abuja - FCT.
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ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMENV/EA/EIA/6063/ Vol. 1/164
15th October, 2021

The Managing Director,
Indorama Eleme Fertilizer & Chemicals Limited,
Indorama Complex,
Eleme,
Rivers State.

**RE: SUBMISSION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA):
SCOPING WORKSHOP FOR THE PROPOSED IEFCL – TRAIN3 PROJECT
(AMMONIA AND UREA PLANT)**

Please refer to your letter dated 11th October, 2021 on the above subject.

2. I am directed to inform you that Mr. Gbolahan Temilorun (Senior Scientific Officer) has been nominated to participate in the field data gathering exercise and laboratory analysis witnessing.
3. I am further directed to request you to pay the sum of Two Hundred and Fifty Thousand Naira (₦250,000:00) only, being the travel and Duty Tour Allowance (DTA) for the participating officer.
4. Please kindly provide necessary logistics to ensure hitch free exercise. The officer can be reached on GSM number 08051691967. You may wish to contact the undersigned on GSM number 08037869670 for further clarification.
5. Thank you for your co-operation.


Engr. Gomwalk, Celestine W. G.
For: Honourable Minister



FEDERAL MINISTRY OF ENVIRONMENT

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ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMEnv/EA/EIA/6063/Vol.1/68

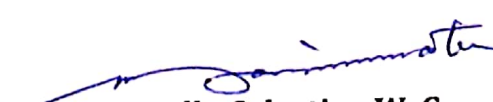
5th August, 2021

The Managing Director,
Indorama Eleme Fertilizer & Chemicals Limited,
Indorama Complex,
Eleme,
Rivers State.

RE: SUBMISSION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGISTRATION FORM AND TOR FOR THE PROPOSED "IEFCL-TRAIN3 PROJECT (AMMONIA AND UREA PLANT)"

Please refer to your letter ref: IEFCL-TR3/ENV/FMEnv/2021/01 dated 14th July, 2021 and the Ministry's letter ref: FMEnv/EA/EIA/6063/Vol.1/59 dated 23rd July, 2021 on the above subject.

2. Following the conclusion of the EIA Site Verification Exercise, the Ministry has placed the Project in Category One (1) with one (1) season baseline data gathering in line with International Best Practices. As a follow up to the Site Verification Exercise, you are required to conduct a Scoping Workshop involving relevant stakeholders in attendance. Also, regulators from the Federal Ministry of Environment and Rivers State Ministry of Environment shall participate as observers.
3. Furthermore, you are requested to submit to the Ministry, the report of the Scoping Workshop, including the project's revised Terms of Reference (TOR) incorporating significant issues raised at the Scoping Workshop and a detailed sampling frame for approval before proceeding to the next stage of the EIA process.
4. You may wish to contact the undersigned on GSM number 08037869670 or Mr. Ladula H. D. on 08020910889 for any further information.
5. Thank you for your cooperation.


Engr. Gomwalk, Celestine W. G
For: Honourable Minister