



Environmental and Social Management Plan (ESMP)

For

Rehabilitation/Reinforcement of 13No. Transmission Substations
(PACKAGE 2 LOT 1):

330/132/33kV T/S at Alaoji (Rivers State), New Haven (Enugu
State), Apir (Benue State)

&

132/33kV T/S at Port Harcourt Main, Port Harcourt Town and Itu
(Rivers State), Aba and Umuahia (Abia State), GCM (Anambra
State), Abakaliki (Ebonyi State), Orji River and Ugwuaji (Enugu
State) and Otukpo (Benue State), respectively..

Under

The proposed Nigeria Electricity Transmission Project
(NETAP).

Prepared by

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Contents

List of Figures	5
List of Tables.....	7
Abbreviations	8
Executive Summary.....	10
CHAPTER ONE.....	21
INTRODUCTION.....	21
1.1 Background	21
1.2 Project Locations.....	22
1.3 ESMP Objectives	30
1.4 Approach.....	30
1.6 Impact Evaluation Methodology.....	31
1.6.1 Magnitude of Impact	32
CHAPTER TWO.....	33
ENVIRONMENTAL LEGISLATIVE AND REGULATORY FRAMEWORK.....	33
2.1. National Legal Framework	33
2.1.1 National Environmental Laws.....	33
2.2. International Safeguards Policies/Standards.....	34
CHAPTER THREE.....	39
PROJECT DESCRIPTION	39
3.1. Project Scope	39
3.2. Scope of Rehabilitation/ Reinforcement.....	40
CHAPTER FOUR.....	42
ENVIRONMENTAL AND SOCIAL BASELINE.....	42
4.1. ALAOJI 330/132/33 KV TRANSMISSION SUBSTATION.....	42
4.1.1 Project Location.....	42
4.1.2 Environmental and Social Baseline.....	42
4.1.3 Audit Findings at the Substation.....	44
4.1.4 Proposed Intervention under NETAP.....	46
4.1.5 Additional Interventions Recommended for Implementation.....	46
4.1.6 Potential Environmental and Social Impacts associated with the intervention.....	47
4.2.1 Project Location.....	48
4.2.2 Environmental and Social Baseline.....	48
4.2.3 Audit Findings at the Substation.....	49
4.2.4 Proposed Intervention under NETAP.....	50
4.2.5 Additional Interventions Recommended for Implementation.....	50

4.2.6	Potential Environmental and Social Impacts associated with the intervention	51
4.3.1	Project Location.....	51
4.3.2	Environmental and Social Baseline.....	52
4.3.3	Audit Findings at the Substation.	53
4.3.4	Proposed Intervention under NETAP.....	56
4.3.5	Additional Interventions Recommended for Implementation.....	56
4.3.6	Environmental and Social Impacts associated with the proposed rehabilitation works.....	57
4.4	PORT HARCOURT 133/33 KV TRANSMISSION SUBSTATION	57
4.4.1	Project Location.....	57
4.4.2	Environmental and Social Baseline.....	57
4.4.3	Audit Findings at the Substation.	59
4.4.4	Proposed Intervention under NETAP.....	63
4.4.5	Additional Interventions Recommended for Implementation.....	63
4.5	PORT HARCOURT (TOWN) 132/33 KV TRANSMISSION SUBSTATION	64
4.5.1	Project Location.....	64
4.5.2	Environmental and Social Baseline.....	64
4.5.3	Audit Findings at the Substation.	65
4.5.4	Proposed Intervention under NETAP.....	68
4.5.5	Additional Interventions Recommended for Implementation.....	68
4.5.6	Environmental and Social Impacts associated with the proposed rehabilitation project.....	69
4.6	ITU 132/33KV TRANSMISSION SUBSTATION	70
4.6.1	Project Location.....	70
4.6.2	Environmental and Social Baseline.....	70
4.6.3	Audit Findings at the Substation.	71
4.6.4	Proposed Intervention under NETAP.....	73
4.6.5	Additional Interventions Recommended for Implementation.....	74
4.6.6	Associated Environmental and Social Impacts	74
4.7	ABA 132/33KV TRANSMISSION SUBSTATION	75
4.7.1	Project Location.....	75
4.7.2	Environmental and Social Baseline.....	75
4.7.3	Audit Findings at the Substation.	75

4.7.4	Proposed Intervention under NETAP.....	79
4.7.5	Additional Interventions Recommended for Implementation.....	79
4.7.6	Potential Environmental and Social Impacts associated with the intervention	80
4.8.	UMUAHIA 132/33 KV TRANSMISSION SUBSTATION.....	81
4.8.1	Project Location.....	81
4.8.2	Environmental and Social Baseline.....	81
4.8.3	Audit Findings at the Substation.	81
4.8.4	Proposed Intervention under NETAP.....	84
4.8.5	Additional Interventions Recommended for Implementation.....	84
4.8.6	Potential Environmental and Social Impacts associated with the intervention	85
4.9	ABAKALIKI 132/33 KV TRANSMISSION SUBSTATION.....	86
4.9.1	Project Location.....	86
4.9.2	Environmental and Social Baseline.....	86
4.9.3	Audit Findings at the Substation.	87
4.9.4	Proposed Intervention under NETAP.....	90
4.9.5	Additional Interventions Recommended for Implementation.....	90
4.9.6	Potential Environmental and Social Impacts associated with the intervention	90
4.10.1	Project Location.....	91
4.10.2	Environmental and Social Baseline.....	91
4.10.3	Audit Findings at the Substation.	92
4.10.4	Proposed Intervention under NETAP.....	95
4.10.5	Additional Interventions Recommended for Implementation.....	95
4.10.6	Potential Environmental and Social Impacts associated with the intervention	96
4.11	OJI 132/33 KV TRANSMISSION SUBSTATION.....	96
4.11.1	Project Location.....	96
4.11.2	Environmental and Social Baseline.....	96
4.11.3	Audit Findings at the Substation.	97
4.11.4	Proposed Intervention under NETAP.....	100
4.11.5	Additional Interventions Recommended for Implementation.....	100
4.11.6	Potential Environmental and Social Impacts associated with the intervention...	101
4.12	UGWUAJI 132/33 KV TRANSMISSION SUBSTATION.....	101
4.12.1	Project Location.....	101

4.12.2	Environmental and Social Baseline.....	101
4.12.3	Audit Findings at the Substation.	102
4.12.4	Proposed Intervention under NETAP.....	105
4.12.5	Additional Interventions Recommended for Implementation.....	105
4.12.6	Potential Environmental and Social Impacts associated with the intervention... 106	
4.13	OTUPKO 132/33KV TRANSMISSION SUBSTATION.....	106
4.13.1	Project Location.....	106
4.13.2	Environmental and Social Baseline.....	106
4.13.3	Audit Findings at the Substation.	107
4.13.4	Proposed Intervention under NETAP.....	108
4.13.5	Additional Interventions Recommended for Implementation.....	108
4.13.6	Potential Environmental and Social Impacts associated with the intervention.....	109
CHAPTER FIVE.....		110
ENVIRONMENTAL AND SOCIAL IMPACTS AND RECOMMENDED MITIGATION MEASURES		110
5.1: Environmental and Social Impacts during Construction.....		110
CHAPTER SIX.....		141
STAKEHOLDERS’ CONSULTATIONS/ GRIEVANCE REDRESS MECHANISM (GRM)		141
CHAPTER SEVEN.....		143
MONITORING		143
7.1: Training.....		144
7.2: Cost of Basic office equipment?Capacity Building for ERSU.....		144
CHAPTER EIGHT.....		149
CONCLUSION		149
ANNEX I.....		150
ANNEX II		163
PROTOCOL FOR THE DECONTAMINATION OF PCB MATERIALS AT TCN SUBSTATIONS.		163
Step 1 – Testing and Analysis.		163
Step 2 – Disposal or Decontamination		164

List of Figures

Figure 1: TCN 330kV/132kV Transmission Lines Grid Map of Nigeria indicating the location of the proposed Substation Project sites under NETAP (Package 2- Lot 1).	26
Figure 2: Satellite image showing Alaoji 330/132/33kV Transmission substation.	26
Figure 3: Satellite image showing Apir 330/132kV Transmission Substation.	27
Figure 4: Satellite image showing New Haven 330/132/33kV Transmission Substation.	27
Figure 5: Satellite image showing Port Harcourt (Main) 132/33kV Transmission Substation. ...	28
Figure 6: Satellite image showing Port Harcourt (Town) 132/33kV Transmission Substation....	28
Figure 7: Satellite image showing Itu 132/33kV Transmission Substation.	29
Figure 8: Satellite image showing Aba 132/33kV Transmission Substation.	29
Figure 9: Satellite image showing Umuahia 132/33kV Transmission Substation.	30
Figure 10: Satellite image showing Abakaliki 132/33kV Transmission Substation.	30
Figure 11: Satellite image showing GCM 132/33kV Transmission Substation.	31
Figure 12: Satellite image showing Oji 132/33kV Transmission Substation.	31
Figure 13: Satellite image showing Ugwuaji 132/33kV Transmission Substation.	32
Figure 14: Satellite image showing Otukpo 132/33kV Transmission Substation.	32
Figure 15: Containers used for storage of construction materials/Port Harcourt-Aba Road (leading to the Substation entrance).	47
Figure 16: Properly maintained switchyard floor/Stagnated water body at base of transformer.	48
Figure 17: Substation Administrative building/Existing Control Room building.	56
Figure 18: Old control Panels in Control room (ready for decommissioning)/Decrepit furniture being use by operators.	57
Figure 19: Fire Extinguishers at the Substation	58
Figure 20: Dense Overgrowths within the Substation premise/Indiscriminate waste disposal within the substation.	63
Figure 21: Sparsely graveled switchyard floor (with patches of light overgrowths)/ Exposed drainage cable trench.	63
Figure 22: Weed growth in drainage channel/Oil Spill-free transformer base.	64

Figure 23: Improperly stored accessories strewn on the Substation premise/Indiscriminate waste disposal within the Substation premise.	64
Figure 24: Decommissioned equipment littering the Substation premise/Poor storage of Construction Materials.	68
Figure 25: Overgrown weeds covering a significant part of the scantily graveled Switchyard floor/Overgrown weeds blocking drainage channels.	68
Figure 26: Blocked drainage channel resulting from sedimentation/Spilled oil at base of transformer.	69
Figure 27: Spilled transformer oil trapped in stagnated water body (seepages have already affected the ground water supply).	69
Figure 28: Existing Substation Control Room/Foundation for new Control Room (under NEGIP).	70
Figure 29: System Operators' Work area in the existing Substation Control Room/Fire extinguisher in Control room.	70
Figure 30: Itu 132/33kV Substation Switchyard/Existing 1x60MVA Transformer (No oil spillage noticeable).....	75

Abbreviations

AEPB	Abuja Environmental Protection Board
BOD	Biochemical Oxygen Demand
CBs	Circuit Breakers
CHS	Community Health & Safety
CO	Carbon monoxide
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
CTs	Current Transformers
Cond.	Conductivity
dB	Decibel

List of Tables

Table 1: World Bank Safeguard Policies. .	17
Table 2: Substation Locations/Project description.	20
Table 3: World Bank Operational Policies (OPs)	38
Table 4: World Bank Operational Policy Triggered	40
Table 5: Maximum permissible limit for noise intensity (World Bank requirements)	41
Table 6: Standards and Limits for Noise Levels in the Work Environment	41
Table 7: Standards for ambient air quality	41
Table 8: Substation Locations/Project description (Package 2, Lot 1).	44
Table 9: Impact/Mitigation Table (for NETAP Substations Upgrade/Reinforcement)	132
Table 10: Estimated cost of basic equipment and training.....	149
Table 11: Sample Monitoring Checklist	153

E	East
EER	Environmental Evaluation Report
EHS	Environment, Health & Safety
EMF	Electromagnetic Force
EMP	Environmental Management Plan
EPIC	Engineering, Procurement, Installation & Commissioning
ERSU	Environment, Resettlement and Social Unit
ES	Executive Summary
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FCT	Federal Capital Territory
FGN	Federal Government of Nigeria
FME _{nv}	Federal Ministry of Environment
Ft	Feet
GBV	Gender Based Violence
GRM	Grievance and redress Mechanism
HQ	Headquarters
HSE	Health, Social & Environment
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
JHA	Job Hazard Analyses
KV	Kilovolts
LGA	Local Government Area
m	Meter
mm	Millimeter
m/s	Meter per seconds
MVA	Mega Volt Amp
N	North
NEGIP	Nigeria Electricity and Gas Improvement Project
NESREA	National Environmental Standard & Regulatory Enforcement Agency
NETAP	Nigeria Electricity Transmission Project
NO _x	Nitrogen Oxide

OHS	Occupational Health & Safety
OP/BP	Operational Policy
PCBs	Polychlorinated Biphenyls
PCR	Physical Cultural Resources
Ph	Potential Hydrogen
PM	Project Manager
PMU	Project Management Unit
PMT	Project Management Team
PPE	Personal protective equipment
TCN	Transmission Company of Nigeria
TSP	Transmission Service Provider
USD	United States Dollars
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SO ₂	Sulphur dioxide
S/s	Substation
WB	World Bank
WHO	World Health Organisation
MW	MegaWatts
WWI	Written Work Instruction
µg/m ³	Microgram per meter cube
%	Percentage
°c	Degree Celsius

Executive Summary

ES 1. Background

The Federal Government of Nigeria, as part of its efforts to improve the quality and reliability of electricity supply within the country, has taken a number of steps to restructure the Power Sector. The enacting into law of the Power Sector Reform Act (2005) and the eventual unbundling and privatization of the formerly government-owned Power Holding Company of Nigeria (PHCN) was a landmark decision towards achieving this objective.

To support this initiative, the World Bank intends to finance a Nigeria Electricity Transmission Project (NETAP).

The IDA support will finance investments grouped according to geographic locations in order to reduce interdependences and increase efficiency in implementation. Specific target zones include: (i) **North East** and **North-Central** - reinforcing Kaduna-Kano-FCT Axis; (ii) **South-West** including the Lagos network; (iii) **South-South** - reinforcing the Delta area network and (iv) **South East** with reinforcement of capacities in this area.

The projects are site-specific but share similar equipment, layout, operational and functional characteristics under the management of TCN, therefore justifying a consolidated report.

However, for efficiency of implementation, the Project has been divided into three (3No.) Packages {with each Package containing two (2No.) Lots}, whereby two (2No.) ESMP Reports will be produced for each Package in accordance with the division of the proposed sites into Lots.

The project will, among others:

- i). Upgrade, Rehabilitate and Reinforce existing Transmission Substations
- ii). Upgrade, Rehabilitate and Reinforce existing Transmission Lines

This ESMP Report therefore provides a basis for managing environmental and social concerns associated with the implementation of the project for substations that have been grouped under **Package 2 - Lot 1** (i.e. Alaoji, New Haven and Apir 330/132/33kV Substations and Port Harcourt Main, Port Harcourt Town, Itu, Aba, Umuahia, GCM, Abakaliki, Orji, Ugwuaji and Otukpo 132/33kV Transmission Substations) – *See Annexe III for Summary of the Project Packages as detailed by the Procurement Department of PMU.*

These interventions may entail relocation of squatters resulting from encroachment upon the existing Right of Way (ROW) of the transmission lines to be rehabilitated, thus leading

ES 2. ESMP Objectives

The overall objective of this ESMP is to ensure project compliance with applicable national environmental/social legal requirements and the World Bank's environmental and social safeguards policies. Further, the ESMP aims to identify environmental and socio-economic benefits of the project as well as identifying potential adverse environmental and socio-economic impacts.

The ESMP document also describes measures to prevent, minimize and or mitigate identified potential environmental and social impacts within the framework of Environmental, Occupational Health & Safety (OHS) and Community Health & Safety. It provides a logical framework within which identified negative environmental and socio-economic impacts can be mitigated and monitored. In addition, it assigns responsibilities of actions to various actors and provides a timeframe within which the mitigation measures and monitoring can be carried out.

ES 3. ESMP Methodology

The procedures adopted in preparing this ESMP include; review of existing literature on the proposed intervention plan under NETAP (engineering works and duration of implementation as well as environmental and social documentation on the locations where these projects will be implemented- weather, vegetation, social characteristic etc.), field observations and interactions with the staff of the substations and locals.

ES 4. Legal Framework

This ESMP considered national environmental regulations to comply with the regulations of the supervisory ministry, the Federal ministry of Environment as well as the Safeguards policies of the World Bank to comply with International Best Practice.

National Regulations

Regulations of the Federal Ministry of Environment (FMEnv)

The applicable laws are:

- i. The Environmental Impact Assessment Act CAP LFN E12 2004
- ii. National Environmental Protection (Effluent Limitations) Regulations (S.I.8) of 1991
- iii. National Environmental Protection (Pollution Abatement in Industries Producing Waste) Regulation (S.I.9) of 1991,
- iv. Federal Ministry of Environment (FMEnv) National Guidelines for Environmental Audit in Nigeria 1999,

- v. FMEEnv Procedural Guidelines (1995),
- vi. FMEEnv Guidelines and Standards for Environmental Pollution and Control in Nigeria (Act Cap 131 LFN),
- vii. The National Environmental Protection Management of Solid and Hazardous Wastes Regulations (S.I.15, 1991),
- viii. Land Use Act of 1978,
- ix. Public Health Law – CAP 103 of the Laws of Eastern Nigeria (1963),
- x. The Endangered Species (Control of International and Traffic Act, No. 11 of 1985),
- xi. National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 25 of 2007.

These Laws seek to;

1. Protect the environment from all sorts and types of pollution;
2. Protect public health and social welfare;
3. Incorporate environmental resources protection in all social and economic development plans and promote sustainable development to protect the rights of future generations;
4. Conserve ecologically sensitive areas, protecting biodiversity, and rehabilitating environmentally damaged areas;
5. Set inter-ministerial cooperation regulations and standards in various Environmental protection areas and jurisdictions;
6. Promote environmental information collection and publication, public awareness, education and training.

The Nigerian Environmental Laws cover management and protection of various resources, Environmental and Social Impact Assessment (ESIA), penalties to be applied in case of violation of any article presented under the law, emergency preparedness, public participation, research training and public education on environmental issues.

International Standards

The international safeguard policies to be applied here are Operational Policies (OP) of the World Bank. These policies contain the statements of the World Bank regarding the manner of implementation of development projects being financed by it and demonstrates its commitment to the eradication/reduction of poverty and promotion of social equality in the world.

World Bank Operational Policies (OP)

Table 1 below lists the various Operational Policies of the World Bank and highlights those that will be triggered by the implementation of NETAP **Package 2, Lot 2**;

S/N	WORLD BANK SAFEGUARD POLICY	TRIGGERED (Yes/No)	JUSTIFICATION
1	OP 4.01 - Environmental Assessment.	Yes	The impacts associated with the proposed upgrade, rehabilitation and reinforcement of Transmission Lines/Substations will involve existing TCN facilities. These impacts, though significant, are reversible and can be mitigated by the measures proposed in the impact mitigation section of this document. The safeguards instruments required to comply with the respective environmental legislature or safeguards policy of the World Bank are therefore Environmental and Social Management Plans (ESMP) for the existing sites.
2	OP 4.04 - Natural Habitats	No	NETAP will be implemented within existing TCN facilities and will, thus, be putting no habitat at risk.
3	OP 4.09 - Pest Management	No	No Pest control measures are proposed for implementation at any of the sites slated for upgrade, rehabilitation/re-enforcement under this project.
4	OP 4.10 - Indigenous Peoples	No	There are no indigenous peoples in the vicinity of any of the sites covered under this project.
5	OP 4.11 - Physical Cultural Resources	No	Same as in 2 above
6	OP 4.12 - Involuntary Resettlement	No	The rehabilitation/reinforcement works under Package 2, Lot 2 will be carried out entirely within the premises of already existing Transmission Substations listed and will not require relocation of persons.
7	OP 4.36 - Forests	No	Same as in 2 above
8	OP 4.37 - Safety of Dams	No	None of the facilities covered in the project includes a dam.

9	OP 7.60 - Projects in Disputed Areas	No	There are no disputed lands in the project-affected areas.
10	OP 7.50 - Projects on International Waterways	No	The project will not have any impact on the quality or quantity of water in any international waterway.

Table 1: World Bank Safeguard Policies.

Of particular interest in this project, since most of the risks associated with construction activities revolve around OH&S are the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines); the General Guidelines which describe the broad EHS standards for various activities and the sector-specific Guidelines for Electric Power Transmission and Distribution.

As stated earlier, when host country regulations differ from the levels and measures presented in the World Bank operation policies, projects will be required to achieve whichever is more stringent. This also applies if there is a differences between Federal and State standards.

ES 5. Project Scope, Location and Description

The NETAP IDA will finance specific programs to increase quantity, quality and access to the electricity network, particularly in the Northern part of the country. NETAP will also provide support for improvements in the human capacity of the government agencies that will be involved in the implementation of the project through technical assistance and capacity building.

NETAP Scope

The proposed NETAP, which is to be financed from an IDA Credit, is sub-divided into three (3) components as follows:

Sub-component 1(a) will finance investments for Upgrading, and Reinforcement of “brown-field” (i.e. already existing) Sub-stations as well as associated equipment and costs of implementation, in order to expand the grid capacity to 10,00MW and to provide reliability to the system.

Sub-Components 1(b) addresses improvements in power delivery and network reliability on 132kV transmission grid in Kwara, Osun, Ogun, Oyo, Abia, Enugu, Anambra, Edo, Delta, Rivers, Kogi, Kano, Jigawa, Gombe, Borno and Katsina States.

Component 2 supports integrated operation of the power system, restoration and expansion of the SCADA system and tele-communication equipment.

Component 3 will support capacity building and technical assistance activities at key sector institutions and other relevant stakeholders in order to ensure that the implementation of reform program is successfully carried out.

Location/Description of Rehabilitation/ Reinforcement interventions

Under NETAP Package 2, Lot 1, the IDA will finance the rehabilitation/re-enforcement of existing TCN substations to help achieve the overall objectives of the proposed project. The table (Table 2) below highlights details of the various interventions proposed for implementation at the respective TCN substations in this procurement package.

S/N	Transmission Substation/ Capacity	Transmission Region	State	Geo-Political Zone	Project Description
1.	Alaoji 330/132/33kV	Port Harcourt	Rivers	South-South	Rehabilitation of 330kV Substation, Control Room, Digital Control System; Replacement of High Voltage Switchgears and Associated equipment.
2.	Port Harcourt Main 132/33kV	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
3.	Port Harcourt Town 132/33kV	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
4.	ITU 132/33kV	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 60MVA 132/33kV Power Transformers; Rehabilitation of Control Room including Digital Control System, High Voltage Switchgears and Associated Equipment.
5.	New Haven 330/132/33kV	Enugu	Enugu	South-East	Reinforcement with 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers with Associated Equipment; Replacement of High Voltage Switchgears and Rehabilitation of Control Room with Digital Control System.
6.	Oji 132/33kV	Enugu	Enugu	South-	Reinforce with 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.

				East	
7.	Ugwuaji 132/33kV	Enugu	Enugu	South-East	Supply & Installation of 1 x 75Mvar Reactor and 1 x 60MVA 132/33kV High Voltage Switchgears and associated Equipment.
8.	Abakaliki 132/33kV	Enugu	Ebonyi	South-East	Upgrade of 1 x 30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment.
9.	GCM 132/33kV	Enugu	Anambra	South-East	Reinforce with 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.
10.	Aba 132/33kV	Enugu	Abia	South-East	Rehabilitation of 132kV Substation, Control Room, Digital Control System, Replacement of High Voltage Switchgears and Associated equipment.
11.	Umuahia 132/33kV	Enugu	Abia	South-East	Reinforcement with 100MVA 132/33kV Power Transformers and Extension of 132kV Bus with 3 No. Additional Feeder Bays
12.	Apir 330/132/33kV	Enugu	Benue	North Central	Reinforcement with 1 x 150MVA 330/132/33kV and 1 x 60MVA 132/33kV Power Transformers , High Voltage Switchgears with Associated Equipment
13.	Otukpo 132/33kV	Enugu	Abia	North Central	Upgrade of 7.5MVA Power Transformer to 1 x 60MVA 132/33kV, High Voltage Switchgears and Associated Equipment.

Table 2: Substation Locations/Project description.

ES 6. Project Scope, Location and Description

The proposed projects under NETAP Package 2, Lot 1 are located in six (6) states, spread across three (3) geo-political subdivisions, namely: Abia, Anambra, Ebonyi and Enugu States (South-East), Rivers State (South-South) and Benue State (North Central), respectively.

The states in the South-South and South-Eastern geo-political subdivides lie within the rain forest belt of Nigeria. Climatic/meteorological conditions in these locations are more or less similar, experiencing heavy precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the areas are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C - 30 °C and Relative humidity ranges between

80% and 100%, with air often being saturated with water vapour, resulting in precipitation during the rainy season in the various areas.

Benue State on the other hand experiences a tropical sub-humid climate, with two distinct seasons (wet and dry seasons). Annual rainfall in this area ranges for 1,200mm – 1,500mm, with average maximum and minimum daily temperatures of 35 °C and 21 °C in summer and 37 °C and 16 °C in winter, respectively.

The towns hosting the Substations where the proposed projects are to be executed are generally densely populated, with the predominant occupations in these areas being trading, commerce, fishing and trading.

Summary of Audit Findings

Most of the Transmission Substations proposed for rehabilitation under this project are old and have not undergone any significant structural or engineering rehabilitation/re-enforcement since they were commissioned, while a few are desperately in need of URGENT attention.

The surroundings of some of the substations visited are littered with scraps, unused construction equipment, empty casings and spare materials. A good number of the premises are overgrown with weeds (encouraging infestations by dangerous insects, rodents and reptiles).

However, wastes management at the substation visited is generally good, as there were clearly delineated areas where junks and scraps were kept, though wastes were not sorted/segregated for proper disposal in most of the Substation.

Some of the cable trench slabs in the switchyards are either broken or displaced while some of the switchyard floors almost completely bare of gravel.

The protection and lighting systems in most of the substations are faulty, posing grave risks for operators while carry out their duties, thereby constraining them to the use of torches/flashlights at night.

Generally, the community relations is to a great extent cordial in all of the substations visited, though there are occasional agitations when frequent **Load-shedding** or prolonged outages are experienced and also when there are clamours for employment into TCN by the host communities.

Additional Intervention Recommended for Implementation

To bolster environmental and social sustainability of the project and also to add value to environmental and social safeguards, in addition to the interventions proposed for the various Substation under NETAP, other interventions were identified and recommended (i.e. Control room rehabilitation, Improved waste management/disposal and or Storage

of litters and scraps, Rehabilitation of lightning systems, Improved toilets facilities, Provision of First Aid, Re-graveling, Construction of access roads, etc.).

The Contractors are expected to quote for these additional interventions as part of their assignment.

ES 7. Potential Environmental and Social Impacts and Recommended Mitigation Measures for the Proposed Rehabilitation Project

The Rehabilitation/Reinforcement interventions to be carried out at the identified Substations under this Lot, basically include:

- Supply and installation of power transformers, high voltage switch-gears and associated equipment,
- Refurbishment and Construction of new Control Rooms,
- Replacement of Control and Relay panels with digital control systems,
- Construction of Feeder bays.

The above listed interventions will involve some activities that will inevitably occur during project implementation, some of which include Vehicular movements; Job related migrations; Transportation of men and resources to various sites; Interactions between contract workers, locals and TCN Staff; Electrical works, Supply of Equipment/Materials, Excavations, Civil/Construction works, Waste generation, etc.

These activities (mentioned above) may ultimately culminate in some of the under-listed potential impacts associated with the proposed intervention at the selected substations during Construction and Operation phases of the Project:

- i. Injuries (due to mishandling of construction waste),
- ii. Air pollution (due to construction/vehicular emissions),
- iii. Noise pollution (due to construction noise emissions),
- iv. Electric shocks,
- v. Power outages,
- vi. Health and Safety,
- vii. Socio-economic (traffic obstruction/congestion),
- viii. Transmission of communicable diseases (from social interactions between TCN Staff, Construction workers and the host communities).
- ix. Clashes between workers and residents of the host communities due to disruption of power supply or disrespect to socio-cultural beliefs/practices of locals,

- x. Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA),
- xi. Risk associated with poor management of a generated waste,
- xii. Risk of soil and groundwater contamination,
- xiii. Theft of construction materials,
- xiv. Gender-Based Violence (GBV) and Sexual Exploitation and Abuse (SEA).

A detailed list of the potential associated impacts of the proposed projects under NETAP Package 2 Lot 1 and the recommended mitigation measures as well as estimated cost for remediation is provided in Table 9.

ES 8. Stakeholders' Consultations

Consultations were limited to the staff of the substation at this stage since a broader consultation for the NETAP was heldj at Abuja (*see stakeholder Consultation for NETAP in the Environmental and Social Management Framework – ESMF and Resettlement Policy Framework – RPF for NETAP*).

However, more direct Stakeholder consultations involving the immediate hosts and concerned communities affected by the project site will be conducted just before, during and at the close of the project to ensure a smooth project implementation through a comprehensive Stakeholders' Engagement Plan to be developed for the project by a consultant.

ES 9. Conclusion

The various projects proposed for implementation by the Federal Government of Nigeria, through the Transmission Company of Nigeria (TCN), under the IDA-financed Nigeria Electricity Transmission Project (NETAP) will involve upgrade, rehabilitation and reinforcement of existing Transmission Substations as well as upgrade of existing Transmission Lines.

The ERSU_PMU has prepared this ESMP, with guidance from the safeguards team of the World Bank, to highlight the existing environmental and social conditions at the respective sites and the potential environmental and social impacts associated with the proposed rehabilitation/reinforcement projects. Using the relevant environmental laws of Nigeria and the Safeguards Policies of the World Bank, this ESMP proffers appropriate mitigation measures and assigns responsibilities as well as costs to the tasks required for the sustainable implementation of the projects.

However, all of these will be of no use if timely and effective monitoring is not carried out to ensure compliance with the recommendations.

An estimated total cost of **USD 1,460,600** is proposed for the mitigation of the potential impacts associated with the rehabilitation/reinforcement of the 13 project sites that fall under Package 2, Lot 1.

It is safe to conclude therefore, that safeguards monitoring of these projects is key to ensuring the sustainable implementation of the proposed projects if the development objective of the World Bank must be met as far as NETAP is concerned.

CHAPTER ONE

INTRODUCTION

1.1 Background

The Federal Government of Nigeria is taking steps to improve the quality and reliability of electricity supply within the country in order to meet the growing demands for energy and improve the quality of the lives of the people. Efforts in this direction in the recent past include the enacting into law of the Power Sector Reform Act (2005) and the eventual unbundling and privatization of the formerly government-owned Power Holding Company of Nigeria (PHCN). This led to some major successes which include: (i) addressing broken institutional and regulatory systems; (ii) enhancing sector governance and accountability; (iii) establishing a new pricing regime (multi-year tariff order, MYTO); and (iv) scaling up private sector investment in the sector.

To support this initiative, the World Bank is financing a Nigeria Electricity Transmission Project (NETAP).

The IDA support will finance investments grouped according to geographic locations in order to reduce interdependences and increase efficiency in implementation. Specific target zones include: (i) **North East** and **North-Central** - reinforcing Kaduna-Kano-FCT Axis; (ii) **South-West** including the Lagos network; (iii) **South-South** - reinforcing the Delta area network and (iv) **South East** with reinforcement of capacities in this area.

Additionally, the project will finance spare equipment in order to provide quick replacements spares and add reliability to the network. Support would be geared towards underpinning key potential ‘growth poles’ in the country for access enhancement and job growth.

Subcomponent 1(a) of NETAP will finance investments for Upgrading and Reinforcement of “brown-field” (i.e. already existing) Sub-stations as well as associated equipment and costs of implementation, in order to expand the grid capacity to 10,000 MW and to provide reliability to the system.

Since the Transmission Substations referred to are similar in Lay-out, equipment content, purpose, functionality and life-span, and all come under the common management of TCN, implying related generic operations, a single consolidated ESMP Report would be produced for this subcomponent.

However, for efficiency of implementation, the Project has been divided into three (3No.) Packages {with each Package containing three (3No.) Lots}, whereby three (3No.) ESMP

Reports will be produced for each Package in accordance with the division of the proposed sites into Lots.

The project will, among others:

- i). Upgrade, Rehabilitate and Reinforce existing Transmission Substations,
- ii). Upgrade, Rehabilitate and Reinforce existing Transmission Lines.

This document, the “Environmental and Social Management Plan (ESMP), lays out the overall policies for the protection of the environment in Nigeria in line the regulations of the Federal Ministry of Environment and the safeguards policies of the World Bank, identifies the potential impacts associated with the implementation of the proposed intervention projects at these stations, proffers appropriate mitigation measures and assigns responsibilities as well as costs to the tasks required for the sustainable implementation of the projects.

Where Bank policy (i.e. *OP 4.01*) and Nigerian guidelines on the protection of the environment differ, the policy that is more stringent will be enforced.

1.2 Project Locations

This ESMP covers Transmission Substations under “PACKAGE 2 – Lot 1”.

The report presents the Environmental and Social Management Plan (ESMP) for the Upgrade, Rehabilitation/Reinforcement of the proposed three (3No.) 330/132/33kV Transmission Substations located at Alaoji (Rivers State), New Haven (Enugu State) and Apir (Benue State) as well as Ten (10No.) 132/33kV Transmission Sub-Stations located at Port Harcourt Main, Port Hacourt Town and Itu (Rivers State), Aba and Umuahia (Abia State) GCM (Anambra State), Abakaliki (Ebonyi State), Oji River and Ugwuaji (Enugu State) and Otukpo (Benue State), respectively.

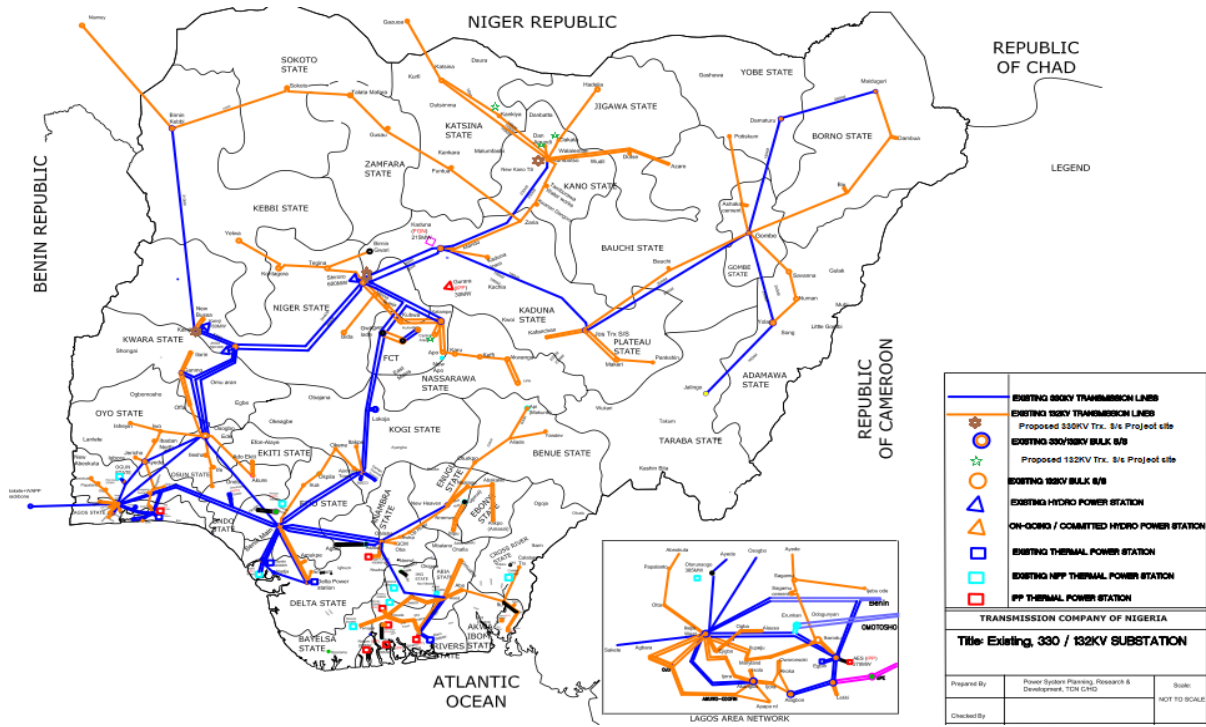


Figure 1: TCN 330kV/132kV Transmission Lines Grid Map of Nigeria indicating the location of the proposed Substation Project sites under NETAP (Package 2- Lot 1).



Figure 2: Satellite image showing Alaoji 330/132/33kV Transmission substation.

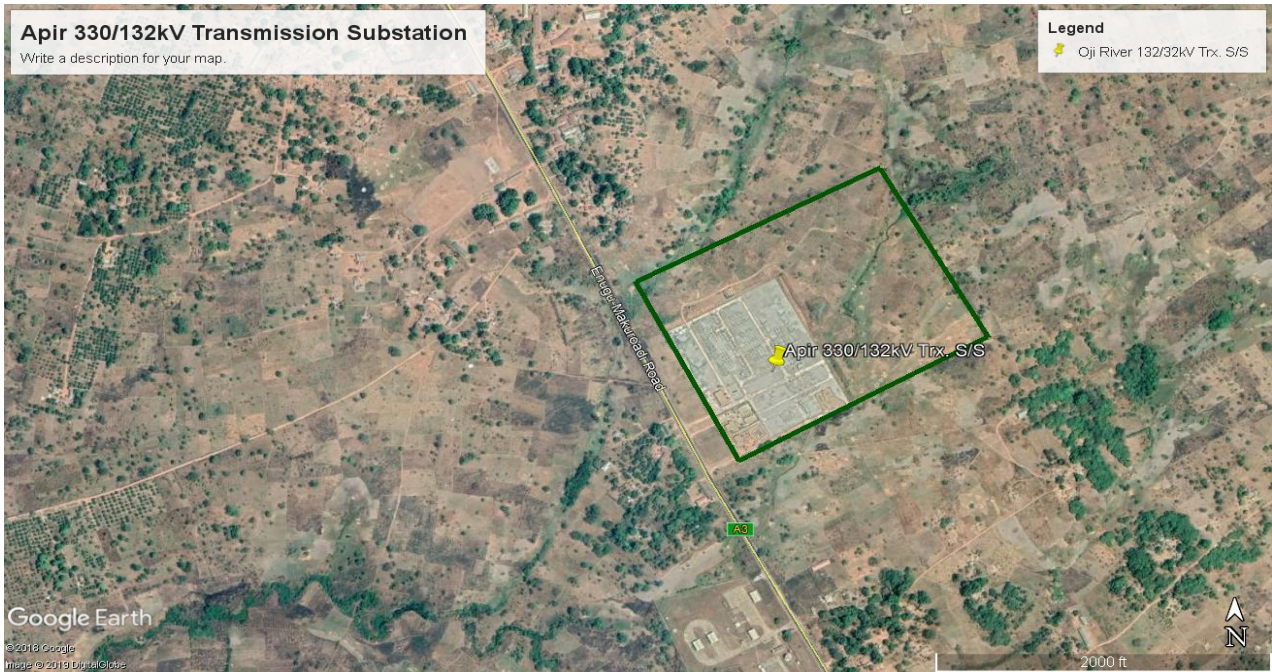


Figure 3: Satellite image showing Apir 330/132kV Transmission Substation.

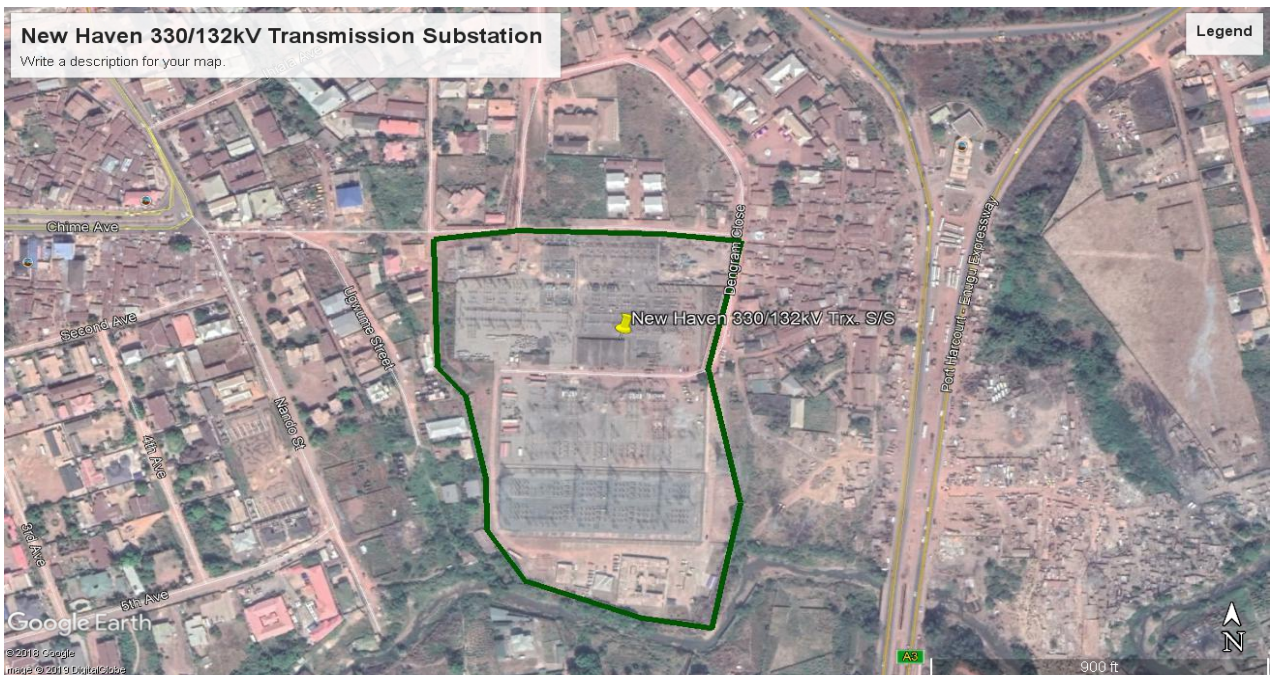


Figure 4: Satellite image showing New Haven 330/132/33kV Transmission Substation.



Figure 5: Satellite image showing Port Harcourt (Main) 132/33kV Transmission Substation.



Figure 6: Satellite image showing Port Harcourt (Town) 132/33kV Transmission Substation.



Figure 7: Satellite image showing Itu 132/33kV Transmission Substation.



Figure 8: Satellite image showing Aba 132/33kV Transmission Substation.



Figure 9: Satellite image showing Umuahia 132/33kV Transmission Substation.

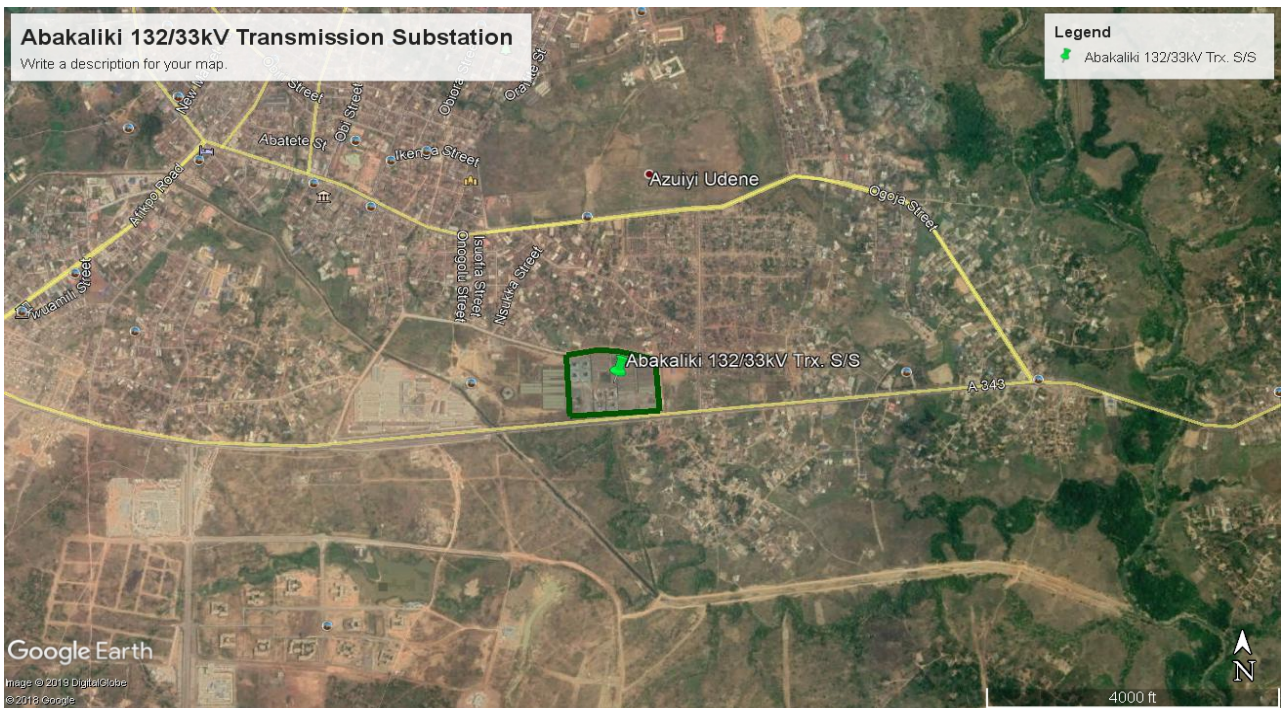


Figure 10: Satellite image showing Abakaliki 132/33kV Transmission Substation.

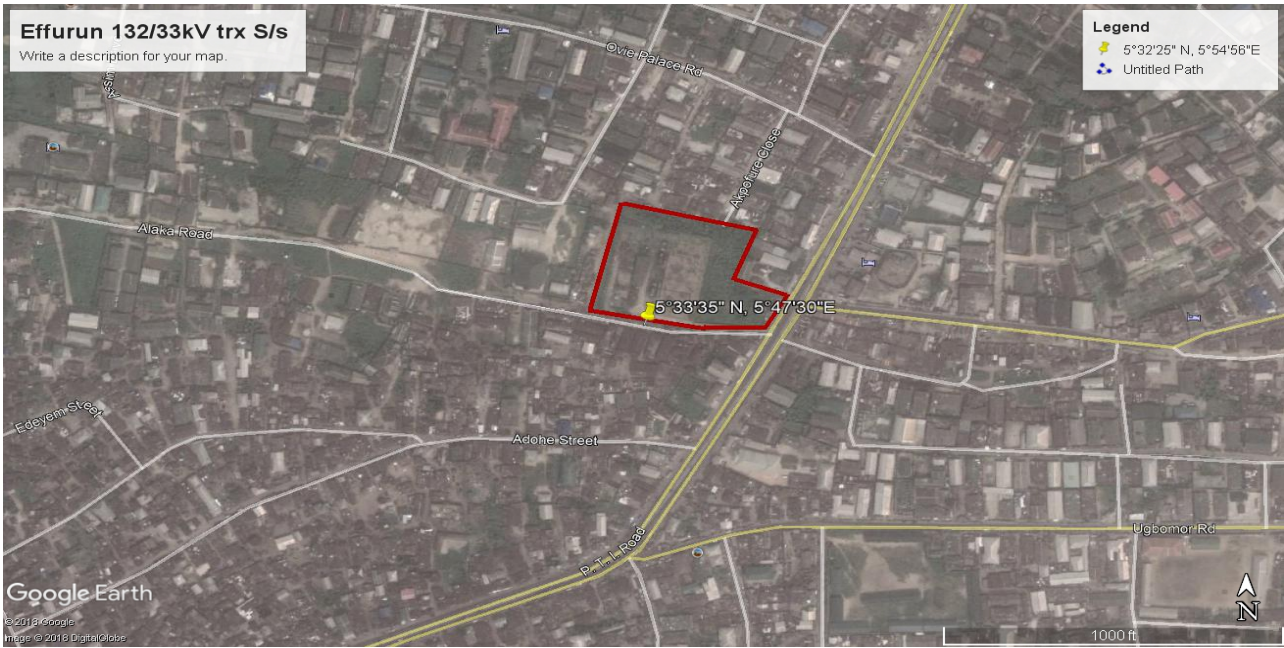


Figure 11: Satellite image showing GCM 132/33kV Transmission Substation.



Figure 12: Satellite image showing Oji 132/33kV Transmission Substation.



Figure 13: Satellite image showing Ugwuaji 132/33kV Transmission Substation.



Figure 14: Satellite image showing Otukpo 132/33kV Transmission Substation.

1.3 ESMP Objectives

The main objective of this ESMP is to ensure that the proposed rehabilitation/reinforcement projects comply with applicable national environmental and social legal requirements of the government of Nigeria as well as the applicable environmental and social safeguards policies of the World Bank. Further, The ESMP aims at identifying environmental and socio-economic benefits of the project as well as identifying any potential adverse environmental and socio-economic impacts.

To mitigate the adverse impacts and enhance project benefits, the ESMP describes measures to prevent, minimize, mitigate and or compensate for adverse environmental and social impacts.

The ESMP is specifically providing the following:

- Assessment of the baseline environmental and social situation of each Site and the surrounding areas (including audit of the existing facilities),
- Assessment of the potential environmental and social impacts of projects under this subcomponent during construction and operation phases,
- Proposed measures that may be adopted to mitigate negative impacts, enhance positive impacts and achieve overall improved management of environmental and social challenges and opportunities.
- A guide Document towards ensuring compliance of the rehabilitation process with pertinent national regulations and World Bank safeguard policy (Whenever there is a discrepancy between national and international requirements, the more stringent ones will be considered).

The ESMP covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of the project life cycle.

1.4 Approach

The preparation of this ESMP involved the compilation of readily available technical data and information concerning the project elements and the project areas. Field visits, investigations (baseline surveys) and audits were conducted in order to assess the existing conditions at the project sites. Interviews as well as discussions (restricted to TCN project Substation site officers) were also held.

The following standards, regulations, and laws were considered in preparing this ESMP:

- i. Nigerian Environmental Impact Assessment Decree No. 86 of 1992,
- ii. The regulations, guidelines and standards of the Federal Ministry of Power as it concerns high voltage power transmission in Nigeria,

- iii. The regulations, guidelines and standards of the Federal Ministry of Environment concerning power generation and transmission activities in Nigeria,
- iv. All International Conventions/Treaties on Environmental Protection to which Nigeria is party,
- v. The Corporate and Operational Policies of the Transmission Company of Nigeria,
- vi. Electricity Law related to the right of way and the public electricity connections
- vii. The World Bank safeguards Operational Policy OP 4.01 on Environmental Impact Assessment,
- viii. The World Bank Safeguard Policies and Environmental Health and Safety Guidelines.

1.5 Description of the rehabilitation/reinforcement works at the Substations

The Rehabilitation/Reinforcement interventions to be carried out at the identified Substations under this Lot, basically include:

- Supply and installation of power transformers, high voltage switch-gears and associated equipment (complete replacements with higher capacity transformers in some substations while additional transformers will be installed to upgrade the capacity of other substations),
- Refurbishment and Construction of new Control Rooms (refurbishment of old and dilapidated existing control rooms in some of the substations, while entirely new control rooms will be constructed in some of the substations),
- Replacement of Control and Relay panels with digital control systems,
- Construction of Feeder bays.

The above listed interventions will involve some activities that will inevitably occur during project implementation, some of which include Vehicular movements; Job related migrations; Transportation of men and resources to various sites; Interactions between contract workers, locals and TCN Staff; Electrical works, Supply of Equipment/Materials, Excavations, Civil/Construction works, Waste generation, etc.

1.6 Impact Evaluation Methodology

The various impacts associated with the rehabilitation projects proposed for Alaoji, Apir and New Haven 330/132kV Transmission Substations and Port Harcourt (Main), Port Harcourt (Town), Itu, Aba, Umuahia, GCM, Abakaliki, Uguwaji Oji River and Otukpo 132/33kV Transmission Substation, respectively, under Package 2 - Lot 1, are characterized as either positive or negative, direct or indirect, immediate or long-term to depict the level of their importance and probability of occurrence during

construction or operation phases. Additional description of these impacts is also provided based on their reversibility or otherwise.

1.6.1 Magnitude of Impact

This describes the degree and extent to which the proposed NETAP interventions at these substations will alter the environment.

- The impacts associated with the NETAP sub-projects are characterized as either positive or negative depending on their merits. The negative impacts are further classified as Negligible, Low, Medium, or High based on the following parameters:
- **Duration** – the weight of impact is directly proportional to the duration of exposure of the receptor to the said impact, except for impacts that cover a wide area or exceed the life span of the project.
- **Time** – The time of which an impact commences or occurs can be vital to construction and maintenance operations.
- **Area** – The area impacted is to be considered, as some impacts may extend beyond the project's boundaries or interfere with land regulations, etc.
- **Probability** – The chance of an impact occurring and its frequency is to be assessed
- **Reversibility** - The possibility and extent to which an impact can be intervened or mitigated for a factor to return to the Baseline environment,

Compliance – National and international standards and regulations may dictate an impact's maximum allowable consequence.

CHAPTER TWO

ENVIRONMENTAL LEGISLATIVE AND REGULATORY FRAMEWORK

The World Bank, like most donor agencies, requires that projects funded by them comply with relevant International best practices, in this case, as it pertains to environmental and social sustainability. This section therefore lists the relevant national and International environmental and social policies, legal and administrative framework as well as the safeguards policies of the World Bank that will guide the implementation of these NETAP sub-projects at Alaoji, Apir, New Haven, Port Harcourt (Main), Port Hacourt (Town), Itu, Aba, Umuahia, GCM, Abakaliki, Ugwuaji Oji River and Otukpo Transmission substations.

Where any two or more of these policies differ the more stringent or that which favours the development objective of the World Bank more will prevail.

2.1. National Legal Framework

The national environmental regulatory framework applicable to Electrical Energy Transmission projects includes the following laws and decrees:

2.1.1 National Environmental Laws

The Federal Ministry of Environment is the custodian of the Nigerian Environmental Laws. These laws cover the main issues pertaining to environmental protection and strive to attain the following objectives among others:

- i. Protecting the environment from all sorts and types of pollution;
- ii. Protecting public health and social welfare;

Some specific guidelines to be used in ensuring compliance include the following:

1. Environmental Impact Assessment (EIA) ACT. CAP E12, LFN 2004

The E.I.A. Act, as it is informally called, deals with the considerations of environmental impact in respect of public and private projects.

Sections relevant to environmental emergency prevention under the EIA include:-

- **Section 2(1)** requires an assessment of public private projects likely to have a significant (negative) impact on the environment,
- **Section 2(4)** requires an application in writing to the Agency before embarking on projects for their environmental assessment of projects to determine approval,

- **Section 13** establishes cases where an EIA is required,
 - **Section 60** creates a legal liability for contravention of any provision,
- **The Nigerian Urban and Regional Planning ACT. CAP 138, LFN 2004**
- The Urban and Regional Planning Act is aimed at overseeing realistic, purposeful planning of the country to avoid overcrowding and poor environmental conditions. In this regard, the following section becomes instructive:-
- **Section 39(7)** establishes that an application for land development would be rejected if such development would harm the environment or constitute a nuisance to the community,
- **Harmful Waste (Special Criminal Provisions) ACT. CAP H1, LFN 2004**
- The Harmful Waste Act prohibits, without lawful authority, the carrying, dumping or depositing of harmful waste in the air, land or waters of Nigeria.

2.2. International Safeguards Policies/Standards

Table 3: World Bank Operational Policies (OPs)

OB/PB	Safeguard	Policy Objective
4.01	Environmental Assessment	Help ensure the environmental and social soundness and sustainability of investment projects. Support integration of environmental and social aspects of projects in the decision-making process.
4.04	Natural Habitats	Promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.
4.09	Pest Management	Minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective, and environmentally sound pest management.
4.10	Indigenous Peoples	Design and implement projects in a way that fosters full respect for indigenous peoples' dignity, human rights, and cultural uniqueness and so that they (1) receive culturally compatible social and economic benefits, and (2) do not suffer adverse effects during the development process.

4.11	Physical Cultural Resources (PCR)	Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.
4.12	Involuntary Resettlement*	Avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
4.36	Forests	Realize the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.
4.37	Safety of Dams	Ensure quality and safety in the design and construction of new dams and the rehabilitation of existing dams, and in carrying out activities that may be affected by an existing dam.
7.50	Projects on International Waterways	Ensure that the international aspects of a project on an international waterway are dealt with at the earliest possible opportunity and that riparians are notified of the proposed project and its details.
7.60	Projects in Disputed Areas	Ensure that other claimants to the disputed area have no objection to the project, or that the special circumstances of the case warrant the Bank's support of the project notwithstanding any objection or lack of approval by the other claimants.

Table 4: World Bank Operational Policy Triggered

Operational Policy Triggered	Trx. Substations affected	Justification
Environmental Assessment (OP/BP 4.01)	Alaoji, Apir, New Haven, Port Harcourt (Main), Port Hacourt (Town), Itu, Aba, Umuahia, GCM, Abakaliki, Ugwuaji, Oji River and Otukpo	The Project requires an environmental and social impact assessment, as the rehabilitation process during various phases of Construction; Operation and Decommissioning of the proposed Substations station will have both positive and negative environmental/social impacts.

Note: other policies are not triggered because all the sites are brown field (existing Substations) and would not affect natural habitat or cultural resources, require displacement or resettlement of persons nor affect sources of livelihood.

World Bank Group EHS Guidelines

The EHS Guidelines contain the performance levels and measures that are acceptable to the World Bank and are generally considered to be achievable within existing facilities - at reasonable costs, using existing technology which generally covers four areas of international good practice, namely:

- i. Environmental;
- ii. Occupational Health & Safety (OHS);
- iii. Community Health & Safety (CHS) and
- iv. Construction and Decommissioning.

The Guidelines also address the occupational and community health and safety hazards during the construction, operation, and decommissioning of Power Transmission projects. The occupational health and safety hazards may include physical hazards such as working at heights, working with live power, and exposure to chemicals. According to the guidelines the major community health and safety hazards are aircraft safety, electrocution, and electromagnetic interference.

Table 5: Maximum permissible limit for noise intensity (World Bank requirements)

Requirements of WB			
Noise	Receptor	One hour L_{Aeq} (dBA)	
		Day time 7 a.m. to 10 p.m.	Night time 10 p.m.to 7 a.m.
	Residential	55	45
Industrial	70	70	

Table 6: Standards and Limits for Noise Levels in the Work Environment

World Bank Requirements			
Noise	Location /activity	Equivalent level $L_{Aeq,8h}$	Maximum $L_{Amax,fast}$
	Heavy Industry (no demand for oral communication)	75 dB(A)	110 dB(A)
	Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
	Open offices, control rooms, service counters or similar	45-50 dB(A)	N/A
	Individual offices (no disturbing noise)	40-45 dB(A)	N/A
	Hospitals	30-35 dB(A)	40 dB(A)

Table 7: Standards for ambient air quality

World Bank Requirements ($\mu\text{g}/\text{m}^3$)					
Ambient air parameters		Ambient air pollutants threshold according to WHO			
Air Quality	Exposure period	1 hr	8 hr	24 hr	1 year
	Carbon monoxide CO $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	N/A
	Sulfur dioxide SO ₂ $\mu\text{g}/\text{m}^3$	N/A	N/A	125	N/A
	Nitrogen oxides NO _x $\mu\text{g}/\text{m}^3$	200	N/A	N/A	40

NETAP - ESMP (Package 2 – Lot 1) September, 2019

Particulates PM ₁₀ µg/m ³	N/A	N/A	150	70
Particulates PM _{2.5} µg/m ³	N/A	N/A	N/A	N/A
TSP µg/m ³	N/A	N/A	230	80
Ozone	N/A	160	100	N/A

CHAPTER THREE

PROJECT DESCRIPTION

The Nigeria Electricity Transmission Project (NETAP) is part of the continuous effort of the Federal Government of Nigeria to improve the quality of the lives of the citizens through access to power for homes and businesses. NETAP is designed to finance specific programs to increase quantity, quality and access to the electricity network.

NETAP will also provide support for improvements in the human capacity of the government agencies that will be involved in the implementation of the project through technical assistance and capacity building.

The gains in the implementation of NETAP, among others, include; improvement the voltage level and system stability, improvement in the quality and reliability of available electricity supply to power homes and businesses, Increase in the revenue base of TCN.

3.1. Project Scope

NETAP, which is to be financed from an IDA Credit, is sub-divided into three (3) components aimed at addressing some critical TCN needs in Transmission Network Infrastructure, Grid Management and Capacity Building & Technical Assistance.

Sub-component 1a will finance investments grouped by geographic locations to reduce interdependence and increase efficiency in implementation. The geographical areas are selected to cover the entire country as much as possible i.e. (i) the North and Central, reinforcing Kaduna-Kano-FCT Axis; (ii) the South-West including the Lagos network; (iii) the South reinforcing the Delta area network; and (iv) the North East.

Sub-Components 1b addresses improvements in power delivery and network reliability on 132kV transmission grid in Kwara, Osun, Ogun, Oyo, Abia, Enugu, Anambra, Edo, Delta, Rivers, Kogi, Kano, Jigawa, Gombe, Borno and Katsina States.

Component 2 supports integrated operation of the power system, restoration and expansion of the SCADA system and tele-communication equipment.

Component 3 will support capacity building and technical assistance activities at key sector institutions and other relevant stakeholders in order to ensure that the implementation of reform program is successfully carried out.

3.2. Scope of Rehabilitation/ Reinforcement

Under NETAP Package 2, Lot 1, the IDA will finance the rehabilitation/re-enforcement of existing TCN substations to help achieve the overall objectives of the proposed project. The table (Table 8) below highlights details of the various interventions proposed for implementation at the respective TCN substations in this procurement package.

Table 8: Substation Locations/Project description (Package 2, Lot 1).

S/N	Transmission Substation/ Capacity	Transmissi on Region	State	Geo- Political Zone	Project Description
1.	<i>Alaoji 330/132/33kV</i>	Port Harcourt	Rivers	South-South	Rehabilitation of 330kV Substation, Control Room, Digital Control System; Replacement of High Voltage Switchgears and Associated equipment.
2.	Port Harcourt Main <i>132/33kV</i>	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
3.	Port Harcourt Town <i>132/33kV</i>	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.
4.	ITU <i>132/33kV</i>	Port Harcourt	Rivers	South-South	Reinforcement with 1 x 60MVA 132/33kV Power Transformers; Rehabilitation of Control Room including Digital Control System, High Voltage Switchgears and Associated Equipment.
5.	New Haven <i>330/132/33kV</i>	Enugu	Enugu	South-East	Reinforcement with 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers with Associated Equipment; Replacement of High Voltage

					Switchgears and Rehabilitation of Control Room with Digital Control System.
6.	Orji 132/33kV	Enugu	Enugu	South-East	Reinforce with 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.
7.	Ugwuaji 132/33kV	Enugu	Enugu	South-East	Supply & Installation of 1 x 75Mvar Reactor and 1 x 60MVA 132/33kV High Voltage Switchgears and associated Equipment.
8.	Abakaliki 132/33kV	Enugu	Ebonyi	South-East	Upgrade of 1 x 30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment.
9.	GCM 132/33kV	Enugu	Anambra	South-East	Reinforce with 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.
10.	Aba 132/33kV	Enugu	Abia	South-East	Rehabilitation of 132kV Substation, Control Room, Digital Control System, Replacement of High Voltage Switchgears and Associated equipment.
11.	Umuahia 132/33kV	Enugu	Abia	South-East	Reinforcement with 100MVA 132/33kV Power Transformers and Extension of 132kV Bus with 3 No. Additional Feeder Bays
12.	Apir 330/132/33kV	Enugu	Benue	North Central	Reinforcement with 1 x 150MVA 330/132/33kV and 1 x 60MVA 132/33kV Power Transformers , High Voltage Switchgears with Associated Equipment

CHAPTER FOUR

ENVIRONMENTAL AND SOCIAL BASELINE

This section describes the prevailing environmental and social conditions at the respective locations where the proposed projects under NETAP Package 2, Lot 1 will be implemented.

It establishes their various safeguard inadequacies, highlights the existing occupational health/ safety concerns and weighs the potential impacts the proposed projects will have on the immediate environment and staff working at the substations. In a bid to improve the environmental, health and social conditions at these substations and mitigate perceived potential negative impacts, while optimizing the positive impacts, this section recommends various safeguards interventions that should be implemented at the respective substations alongside the proposed engineering interventions in order to add value to the overall rehabilitation/reinforcement projects, bring the substations to a minimum best-practice standard and help achieve the development objective of the World Bank.

The substations covered in this ESMP are; Alaoji, Apir and New Haven 330/132kV Transmission substations and Port Harcourt (Main), Port Harcourt (Town), Itu, Aba, Umuahia, GCM, Abakaliki, Ugwuaji Oji River and Otukpo 132/33kV Transmission Substations, respectively.

4.1. ALAOJI 330/132/33 KV TRANSMISSION SUBSTATION

4.1.1 Project Location

Alaoji 330/132/33 kV Transmission Substation is Alaoji (along Port Harcourt – Aba road), a town in Abia State in the south eastern part of Nigeria.

The Substation lies within approximate coordinates $5^{\circ}03'13.13''$ North and $7^{\circ}19'24.97''$ East of the Equator, sitting approximately 53m (177ft) above sea level.

4.1.2 Environmental and Social Baseline

Abia was formed from the first letters of four groups of people; Aba, Bende, Isuikwuato and Afikpo. These were the major groups in the state during its creation. Abia was initially a part

of Eastern Nigerian Region until 27th May, 1967. The state became a part of the East Central State which was created by the then military head, General Yakubu Gowon.

The East Central Nigeria was split into Anambra and Imo on the 3rd February, 1976 by General Murtala Mohammed and on the 27th August, 1991, Abia state was then carved out from Imo state under General Ibrahim Babaginda. This action increased the number of states in Nigeria.

In addition, General Sani Abacha in October 1991 created six more states in the federation making the number of states in Nigeria thirty-Six. It was during this process that four local government areas (LGAs) namely Onicha, Ohazara, Afikpo North and Afikpo South was transferred to Ebonyi State.

The Igbo Ethnic group is the predominant group in Abia State.

Alaoji features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in this area.

The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C-28 °C in the town

The substation is hosted by Umu Okkpui community (in Aba South LGA) and is not too far from the bustling commercial hub of Aba town.

The host community is peaceful and the relations with the Substation is cordial.

Alaoji town is densely populated and the predominant occupation in this area is trading and farming.

The crude oil and gas production accounts for over 39% of the Abia State's GDP. On the other hand, the manufacturing sector contributes 29% of the state's GDP. The industrial sector of the state is Aba. Aba town has textile manufacturing companies, pharmaceutical companies, cement factories, plastic factories and cosmetics.

Agriculture accounts for 27% of the GDP in the state. Abia has fertile land that produces yams, maize, potatoes, rice, cashews, plantains, taro and cassava. Cash crop such as oil palm are also present in the state.

In 2007, Abia state recorded a total GDP of \$18.69 billion.

4.1.3 Audit Findings at the Substation.

Alaoiji 330/132/33kV Transmission substation is generally clean, though a few environmental maintenance lapses were noticed. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

4.1.3 a *The Substation Environment*

The substation environment is overgrown with weeds in some areas (especially during the rainy season), however the substation premises is well drained (this is helped by the slopy nature of the substation land area, aside from the existence of a good drainage network).

The Substation appears to be generally well maintained and tidy.



Figure 15: Extension works on-going on existing Control Room building /Well defined and fenced storage area the substation premise.



Figure 15: Containers used for storage of construction materials/Port Harcourt-Aba Road (leading to the Substation entrance).

4.1.3 b *The Substation Switchyard*

The Switchyard has almost been completely taken over by grasses and dense shrubs (including the, albeit “sparsely” graveled switchyard area).

Some of the Cable trench covers slabs are broken thereby leaving current carrying cables exposed.



Figure 16: Properly maintained switchyard floor/Stagnated water body at base of transformer.

4.1.3 c *The Control Rooms*

Generally, the building structures in the Substation are not routinely maintained.

The Control room space is rather choked as there is barely enough working space for System operators.

4.1.3 d *Waste Management*

The wastes found at the Alaoji Transmission substation are mainly wastes from the ongoing rehabilitation works (including scrap wood from packing containers, scrap cables and polyethylene materials used in wrapping substation equipment).

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segregated into the different waste streams but are dumped haphazardly. Waste collection points are major attraction for insects and rodents which in turn attracted reptiles especially snakes.

However, there is a clearly defined area within the substation premises dedicated for storage of equipment/materials and also for storing defective/broken equipment, scrap, etc..

4.1.3 e Occupational Health and Safety

A major Occupational Health and Safety concern at Alaoji substation is the partial enforcement of the use of PPEs by workers and lack of proper screening and guidance for visitors to the substation.

Adequate First-Aid Equipment/materials were not readily available at the substation.

4.1.3 f Security

Alaoji transmission substation premises is well fenced with block walls. The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

The illumination within confines (including the switchyard) and the immediate external perimeter of the substation is rather poor and needs to be improved upon.

4.1.3 g Fire Emergency and Precautions

Fire extinguisher canisters were available, functional and serviced. The staff on duty are conversant with the use of the extinguishers.

4.1.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Rehabilitation of 330kV Substation, Control Room, Digital Control System and Replacement of High Voltage Switchgears and Associated equipment of High Voltage Switchgears and Associated equipment.

4.1.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.1.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- The substation vehicular drive-way should be retarred in order to prevent erosion, damage to vehicles and ease of movement (especially during the period when rehabilitation works is going on);
- Clearing of grass and removal of scrap materials;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Installation of water hydrants automatic fire alarm systems in the switchyards;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Installation of lighting system for the entire substation surrounding (including areas around the immediate external part of the substation perimeter fence);
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.1.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Alaoji 330/132/33kV transmission substation;

- Objects falling on persons,
- Electric shocks (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Waste generation and indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of communicable infections like HIV/AIDS and other Sexually Transmitted Diseases (STDs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.2 APIR 330/132 KV TRANSMISSION SUBSTATION

4.2.1 Project Location

Apir 330/132/33 kV Transmission Substation is situated in Apir town (along Enugu-Makurdi road) in Benue State in Nigeria.

The Substation lies within approximate coordinates 7°37'35.34" North and 8° 34'11.49" East of the Equator, sitting approximately 134m (439ft) above sea level.

4.2.2 Environmental and Social Baseline

Benue is named after the river Benue, the state is made up of 23 Local Government Areas (LGAs). It is the 9th most populous state in Nigeria. The state was created on February 3, 1976 by the then military ruler late General Murtala Mohammed.

In 1991, Benue state and some areas of Kwara state were carved out to create the present Kogi state. In the early twentieth century, it was carved out of the protectorate of Northern Nigeria. The territory was formerly known as the Munshi province until 1918 when the “Benue River” was adopted.

The TIV speaking part of benue of state has 14 LGAs while the Idoma – Igede area makes up the remaining. The state constitutes of Several ethnic groups namely: Tiv, Idoma, Igede, Etulo, Abakpa, Jukulu, Hausa, Igbo, Akweya and Nyifon. However, the Tiv are the predominant ethnic group in the state.

Benue state features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

Benue state is the food basket of the nation. It is rich in agricultural produce such as yam, rice, beans, cassava, potatoes, maize, soybeans, Sorghum, millet and cocoyam. 70% of Nigeria’s Soya Bean production is from Benue state.

Farming is the main occupation making up 75% of the population in the state. This makes agriculture the main source of their economy. The fishing industry is also viable in the state. In 2007, the State recorded a GDP of \$6.86 billion.

4.2.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Otukpo transmission substation.

4.2.3 a *The Substation Environment*

The Substation premise has been very well maintained, although there are a few noticeable patches of weeds and overgroths around the premise.

If not checked, there is a possible threat of erosion ravaging the substation premises

The access road leading to the Substation is clearly defined, tarred and free of encumbrances.

4.2.3 b *The Substation Switchyard*

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.

4.2.3 c *The Control Room*

The building housing the control room is well maintained.

4.2.3 d *Waste Management*

House-keeping in this substation is very good with the substation looking neat and well maintained.

There is a clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment.

4.2.3 e *Occupational Health and Safety*

Waste management within the Substation premises is very good. There are no litters about and the premises is well kempt and neat.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

4.2.3 f *Security*

There are security personnel manning the gates and overseeing the premises all through the day.

4.2.3 h *Fire Emergency and Precautions*

Fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.2.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 150MVA 330/132/33kV and 1 x 60MVA 132/33kV Power Transformers , High Voltage Switchgears with Associated Equipment

4.2.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.2.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Check Erosion threat in the substation
- Maintenance of effective weed control practiced at the substation;
- Removal and disposal/proper storage of scrap materials;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;

- Provision of first Aid equipment/materials and training in administration of First Aid.

4.2.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Apir IV 330/132kV transmission substation;

- Objects falling on persons,
- Electric shocks (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Waste generation and indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of communicable infections like HIV/AIDS and other Sexually Transmitted Diseases (STDs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.3 NEW HAVEN 330/132 KV TRANSMISSION SUBSTATION

4.3.1 Project Location

New Haven 330/132/33 kV Transmission Substation is situated in New Haven, a metropolitan city and economic hub for commerce and industry in Enugu North L.G.A. of Enugu state.

The Substation lies within approximate coordinates 6° 27'25.23" North and 7° 32'16.70" East of the equator, sitting approximately 161m (527ft) above sea level.

4.3.2 Environmental and Social Baseline

Pre – historically, the earliest settlement dates back to the 6,000 BC based on the early pottery works that were found in the Okigwe- Nsukka axis. The name of the state was derived from the capital city, Enugu. Enugu means Top of the Hill and the state is often referred to as the coal city state or wawa state. The first European settlers entered the region in 1909, led by the British Engineer named Albert Kitson and while mining for silver he found coal in the Udi ridge.

After the discovery, the colonial Governor of Nigeria, Lord Frederick Lugard took an interest in coal mining and by 1914 the first coal was shipped to the Britain. Enugu obtained township status in 1917 and became a British interest and foreign businesses began to invest in the state.

Enugu became the administrative headquarters of the southern and eastern provinces in 1929. Later from 1954 to 1967 it was the headquarters for the eastern region. During the civil war between 1967 and 1970, it became the defunct state of Biafra.

Enugu state was created by the then military head of state, General Ibrahim Babaginda on the 27 August, 1991. After years of agitation as well as complaints of injustice and marginalization by the wawa leaders and people.

New Haven features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C - 30 °C in the city.

The substation is hosted by Ogui-Nike Community (Enugu North L.G.A.). The host Community is peaceful and the relations with the Substation is cordial.

New Haven is densely populated and the predominant occupation in this area is trading and farming.

Enugu state has a public sector driven economy. The state is mostly rural and agrarian with a significant amount of its people engaged in farming. In the urban settlement of the state, trading is the predominant means of livelihood.

Another area of livelihood explored by the people is manufacturing and the state has a vast number of markets which are used by the people for trading. The most prominent of which is Ogbete main market in the state capital of Enugu.

4.3.3 Audit Findings at the Substation.

New Haven 330/132/33kV Transmission substation is generally poorly maintained. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

4.3.3 a *The Substation Environment*

The building structures in the Substation are very old and require refurbishing and proper maintenance.

There were litters of decommissioned equipment, scraps, condemned parts and casings noticed (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment which is also not too pleasing to the eye.



Figure 17: Substation Administrative building/Existing Control Room building.



Figure 18: Old control Panels in Control room (ready for decommissioning)/Decrepit furniture being use by operators.

4.3.3 b *The Substation Switchyard*

Weeds can be seen growing on the Switchyard floor (which is not adequately graveled) and this situation could get out of Control when the rains set in.



Figure 19: : Improperly disposed construction waste/Overgrowths within substation premise.



Figure 20: Existing (only) warning signage on Entrance gate to Substation premise/Substation First Aid Box application of weed control chemical.

4.3.3 c *The Control Rooms*

The Control room space is rather choked as there is barely enough working space for System operators.



Figure 19: Fire Extinguishers at the Substation

4.3.3 d *Waste Management*

Though there are litters of construction equipment, scraps materials and casings noticeable at the substation (resulting from on-going construction works in the substation), wastes are generally properly managed in the substation.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

4.3.3 e *Occupational Health and Safety*

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

4.3.3 f *Security*

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

4.3.3g Fire Emergency and Precautions

Fire extinguisher canisters were available, functional and serviced at the Substation and the staff on duty were conversant with the use of the extinguishers (nonetheless, the transmission substation operators have had little or no training in firefighting/prevention till date).

4.3.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation of 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers with Associated Equipment, Replacement of High Voltage Switchgears and Rehabilitation of Control Room with Digital Control System (DCS).

4.3.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.3.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Clearing of grass/overgrowths and removal of scrap materials;
- Removal and disposal/proper storage of scrap materials;
- Delineation/Construction of a scrap/spare yard within the Substation premises;
- Installation of water hydrants automatic fire alarm systems in the switchyards;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.
- Installation of smoke detectors within the control room building.

4.3.6 Environmental and Social Impacts associated with the proposed rehabilitation works.

The following are some of the potential environmental/social impacts associated with the proposed intervention at New Haven 330/132/33kV transmission substation;

- Objects falling on persons,
- Electric shocks (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Waste generation and indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of communicable infections like HIV/AIDS and other Sexually Transmitted Diseases (STDs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.4 PORT HARCOURT 133/33 KV TRANSMISSION SUBSTATION

4.4.1 Project Location

Port Harcourt 132/33 kV Transmission Substation is situated in Port Harcourt which is the capital and largest city of Rivers State in Nigeria.

The Substation lies within coordinates 4°49'57.47North and 7° 2'4.4"East of the Equator, sitting approximately 18m (62ft) above sea level.

4.4.2 Environmental and Social Baseline

The name Rivers state was derived from the many rivers that borders the state. During the colonial period around the 20th Century, different treaties were signed between the different communities and the British colonial government to protect their regions.

After much discontent between the people, Sam Owonaro, Isaac Boro, Nottingham Dick among others formed a “Delta People’s Republic” in February 1996, but the rebellion was not long-lasting because it was dissolved by the federal and old eastern Government.

However, On 27 May 1967, under the regime of General Yakubu Gowon, Rivers state was then created as a result of the split of the Eastern region. Since then, issues about environmental degradation, political marginalization and economic pauperisation remained among the Ijaw people. This led to further creation of Bayelsa state, a state carved out of Rivers state in 1996.

The state population is divided into two major divisions; the riverine and upland division. The predominant ethnic groups Ikwerre, Ijaw and Ogoni. The Upland division of the state covers about 61% and is made up of mainly the Ikwerre and Ogoni people.

Port Harcourt features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

The harmattan, which climatically influences many cities in West Africa, is less pronounced in Port Harcourt. The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C-28 °C in the city.

The substation is hosted by Rumuobiakani Community in Obiokpor L.G.A. in the metropolis of Port Harcourt (one of the major centres of economic activities in Nigeria) in the Niger-Delta area of Nigeria (South-South geopolitical Subdivision).

The area is densely populated and generally, Communities in this part of the country tend to agitative and confrontational. However, the community relations was cordial and there were no incidences of agitations or disruptions.

So far, the state has remained the leading supplier of wealth in Nigeria. Rivers state has a vast reserve of natural gas and crude oil. It has two major oil refineries and seaports, airports and other different industrial estates.

It is by far the richest and most essential part of the African region of the British Empire. Silica Sand, Glass and Clay are other natural resources which can be found in within the state.

Before the discovery of crude oil in 1951, Agriculture was the leading occupation in Rivers state. In the 19th Century, the state was referred to as the oil rivers protectorate because of the abundant palm oil and kernel. Rivers state is one of the major states in Nigeria which produces Cassava, Yam, Cocoyam, Maize, Rice and Beans. The state's land mass is suitable for cultivation. The fishing industry is also very important in the state provides valuable seafood such as crabs, shrimps, oysters, and sea snails.

In 2007, Rivers state was ranked 2nd nationwide with a Gross Domestic Product (GDP) of \$21.07 Billion.

4.4.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Port Harcourt (Main) substation.

4.4.3 a *The Substation Environment*

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

The Substation premise has almost been completely taken over by grasses and dense shrubs (which could be attributed to the high rate of rainfall in this area). However, the switchyard - though thinly graveled, is regularly cleared of such growths.

The Substation premise is properly drained – no incidences of flooding. However, blockages to drainage channels (which also serve as trench cables) could be a problem in future.

The access road leading to the Substation is clearly defined, tarred and free of encumbrances. However, the drive path within the substation premise is dilapidated and in dire need of rehabilitation.



Figure 20: Dense Overgrowths within the Substation premise/Indiscriminate waste disposal within the substation.



Figure 21: Drive path within Substation premise/Rumuobiokani Road (leading to the Substation entrance).

4.4.3 b *The Substation Switchyard*

The substation switchyard floor is almost bare of gravel, however, it is properly maintained and kept free of weed overgrowths.



Figure 21: Sparsely graveled switchyard floor (with patches of light overgrowths)/ Exposed drainage cable trench.



Figure 22: Weed growth in drainage channel/Oil Spill-free transformer base.

4.4.3 c *The Control Room*

The Control room space for the 132/33kV Substation rather choked as there is barely enough working space for System operators.



Figure 23: Substation Control Room/Working area within Substation Control Room.



Figure 23: Improperly stored accessories strewn on the Substation premise/Indiscriminate waste disposal within the Substation premise.

4.4.3 d ***Waste Production and Disposal***

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segregated into the different waste streams but are dumped haphazardly.

Also, there is no designated area within the substation premises dedicated as a junk yard for storing defective/broken equipment, scrap, etc.).

4.4.3 e ***Occupational Health and Safety***

There is no HSE Staff stationed at the substation (though one of the System Operators oversees Safety issues at the Substation)

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There are no Oil leakages from the transformers in the Substation.

4.4.3 g ***Security***

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day (though this could be breached whenever there are disturbances by the Community).

4.4.3 h ***Fire Emergency and Precautions***

Although fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.4.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers at the 132kV section of the switchyard with Associated Equipment, Replacement of High Voltage Switchgears and Rehabilitation of Control Room with Digital Control Systemv(DCS).

4.4.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.4.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Re-graveling of the switchyard floor;
- Clearing of grass and removal of scrap materials;
- Replacement of old and weak furniture;
- Upgrade of toilet facilities;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Installation of water hydrants and automatic fire alarm systems in the switchyards;
- Rehabilitation of the lighting system at the switchyard;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.
- Paving of access roads within the substation with interlocking tiles or concrete.

4.4.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Port Harcourt 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.5 PORT HARCOURT (TOWN) 132/33 KV TRANSMISSION SUBSTATION

4.5.1 Project Location

Port Harcourt 132/33 kV Transmission Substation is situated in Port Harcourt which is the capital and largest city of Rivers State in Nigeria.

The Substation lies within approximate coordinates 4° 46' 31.44" North and 7° 0' 47.57" East of the equator, sitting approximately 16m (52ft) above sea level.

4.5.2 Environmental and Social Baseline

Port Harcourt features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city. Other details are same as 4.4.2

4.5.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Port Harcourt (Town) substation.

4.5.3 a *The Substation Environment*

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

The Substation premise has almost been completely taken over by grasses and dense shrubs (which could be attributed to the high rate of rainfall in this area). However, the switchyard - though thinly graveled, is regularly cleared of such growths.

The flow of runoff through the drainage channels in the switch premises are hindered as a result of Sedimentation, Blockages by weed overgrowths and cables.

The access road leading to the Substation is clearly defined, tarred and free of encumbrances. However, there is limited space within the substation premise.



Figure 24: Decommissioned equipment littering the Substation premise/Poor storage of Construction Materials.



Figure 25: Overgrown weeds covering a significant part of the scantily graveled Switchyard floor/Overgrown weeds blocking drainage channels.

4.5.3 b *The Substation Switchyard*

The substation switchyard floor is sparsely graveled, however, it is properly maintained and kept free of weed overgrowths.

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.



Figure 26: Blocked drainage channel resulting from sedimentation/Spilled oil at base of transformer.



Figure 27: Spilled transformer oil trapped in stagnated water body (seepages have already affected the ground water supply).

4.5.3 c *The Control Rooms*

The Control room space is rather choked as there is barely enough working space for System operators, however there is an on-going construction of a new Control room under NEGIP.



Figure 28: Existing Substation Control Room/ Foundation for new Control Room (under NEGIP).



Figure 29: System Operators' Work area in the existing Substation Control Room/Fire extinguisher in Control room.

4.5.3 d Waste Management

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segreated into the different waste streams but are dumped haphazardly.

4.5.3 e *Occupational Health and Safety*

There is no HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There were Oil leakages and spillages from the transformers in the Substation.

4.5.3 f *Security*

The Substation is situated within a “criminalized” area of Port Harcourt and the perimeter fence is rather too low with see through grilles.

However, there are security personnel manning the gates and overseeing the premises all through the day (though this could be breached whenever there are disturbances within the vicinity of agitations by the Community).

4.5.3 g *Fire Emergency and Precautions*

Although fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.5.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment.

4.5.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.4.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Re-graveling of the switchyard floor;
- Clearing of grass and removal of scrap materials;
- Replacement of old and weak furniture;
- Upgrade of toilet facilities;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Installation of water hydrants and automatic fire alarm systems in the switchyards;
- Rehabilitation of the lighting system at the switchyard;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.
- Clean-up restoration of soil contaminatd by oil spills within the switchyard and appropriate testing for PCB contamination an remediation.

4.5.6 Environmental and Social Impacts associated with the proposed rehabilitation project.

The following are some of the potential environmental/social impacts associated with the proposed intervention at Port Harcourt (Town) 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.6 ITU 132/33KV TRANSMISSION SUBSTATION

4.6.1 Project Location

Itu 132/33 kV Transmission Substation is situated in Itu town (along Calabar - Itu road) in Akwa Ibom State in Nigeria.

The Substation lies within coordinates 5° 09' 42.92" North and 7°59'38.87"East of the Equator, sitting approximately 80.5m (264ft) above sea level.

4.6.2 Environmental and Social Baseline

Prior to the British invasion in 1904, no central government existed among the people of the what is now Akwa Ibom. The Annang, Oron, Efik, Ibonos and Ibibio were all autonomous groups. Although many Scottish missionaries entered into Calabar in 1848 and Ibono in 1887. The British did not gain absolute control of the region until 1904. In 1904, the Enyong division was created with headquarters at Ikot Ekpene. The creation of Enyong division allowed the ethnic groups unite for the first time.

The Ibibio Union was created in 1928 and in 1948, it transformed from a simple cultural association to a goal driven institution. However in 1967, the mainland part of the Calabar in the then Eastern Nigeria became merely a part of the south eastern state. This occurred under the administration of General Yakubu Gowon during the 12 state structure. In 1976, the south eastern state was changed to Cross River state. The change in name was not satisfying, the people were rather encouraged to continue agitating for their own state.

After the 2nd republic collapsed in 1983, a memorandum requesting the creation of Akwa Ibom state was submitted to the General Buhari administration by the rulers from the 10 local government areas of the mainland part of the then Cross River state. However, it yielded an undesirable result. The people were undeterred and resubmitted their memorandum in 1986, during the General Ibrahim Babangida regime and on September 23, 1987, Akwa Ibom state was created the “land of Promise” after about four decades of agitation by the people.

Akwa Ibom features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

The harmattan, which climatically influences many cities in West Africa, is less pronounced in Port Harcourt. The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C-28 °C in the city.

The substation is hosted by Rumuobiakani Community in Obiokpor L.G.A. in the metropolis of Port Harcourt (one of the major centres of economic activities in Nigeria) in the Niger-Delta area of Nigeria (South-South geopolitical Subdivision).

The area is densely populated and generally, Communities in this part of the country tend to agitative and confrontational. However, the community relations was cordial and there were no incidences of agitations or disruptions.

The primary economic activities are fishing in Akwa Ibom State are fishing for the people in the riverine and coastal areas, farming for the upland dwellers, trading, artisanship and other services. In 2007, the total Gross Domestic Product (GDP) of Akwa Ibom state was \$11.18billion.

4.6.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Itu 132/33kV substation.

4.6.3 a *The Substation Environment*

Owing to the age of the Substation, most of the building structures within the substation premises are decrepit, due to poor asset management/maintenance.

The Substation premise has almost been completely taken over by grasses and dense shrubs (which could be attributed to the high rate of rainfall in this area).

The inefficient drainage system of the Substation has left it susceptible to erosion

The access road leading to the Substation is clearly defined, tarred and free of encumbrances.

4.6.3 b *The Substation Switchyard*

The substation switchyard floor is sparsely graveled, however, it is not properly maintained as weede/ overgrowths can be seen blossoming in patches within the switchchard.

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.

4.6.3 c *The Control Room*

The ceiling of the Control room is leaking due to deterioration of the decking of the building.

The Control Room is spacious and there is available space for future expansion.



Figure 30: Itu 132/33kV Substation Switchyard/Existing 1x60MVA Transformer (No oil spillage noticeable)



Figure 31: The Control Room.

4.6.3 d *Waste Management*

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segregated into the different waste streams but are dumped haphazardly.

4.6.3 e ***Occupational Health and Safety***

There is no trained HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

4.6.3 f ***Security***

There are security personnel manning the gates and overseeing the premises all through the day.

4.6.3 g ***Fire Emergency and Precautions***

Fire extinguishing canisters were available on site, there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.6.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 with 1 x 60MVA 132/33kV Power Transformers, Rehabilitation of Control Room including Digital Control System, High Voltage Switchgears and Associated Equipment

4.6.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.6.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Clearing of grass and removal of scrap materials;
- Provison of a borehole;
- Replacement of old and weak furniture;
- Upgrade of toilet facilities;
- Delineation/Construction of a scrap/spares yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyard/Substation;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.6.6 Associated Environmental and Social Impacts

The following are some of the potential environmental/social impacts associated with the proposed intervention at Itu 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),

- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.7 ABA 132/33KV TRANSMISSION SUBSTATION

4.7.1 Project Location

Aba 132/33 kV Transmission Substation is situated in Aba which is the capital city of Abia State in Nigeria.

The Substation lies within approximate coordinates 5°05'59.33"North and 7°21'20.06" East of the Equator, sitting approximately 60m (197ft) above sea level.

4.7.2 Environmental and Social Baseline

Aba features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in this area. All other environmental and social baseline data are same as 4.1.2

The substation is hosted by Umu Okkpuji community (in Aba South LGA) and in of the the bristling commercial hub of Aba town.

The host community is peaceful and the relations with the Substation is cordial.

Aba town is densely populated and the predominant occupation in this area is trading and farming.

4.7.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Aba 132/33kV substation.

4.7.3 a *The Substation Environment*

The Substation premise has almost been completely taken over by grasses and dense shrubs (which could be attributed to the high rate of rainfall in this area). However, the switchyard - though thinly graveled, is regularly cleared of such growths.

The flow of runoff through the drainage channels in the sunbtation premises are hindered as a result of Sedimentation, Blockages by weed overgrowths and armoured cables.

Generally the Substation environment is not visually appealing (basically because of the buildings structures are: Ill-maintained; Litters of wastes are strewn on the substation

premise, Construction equipment/materials are improperly stored, Stagnant bodies of water resulting from blocked drainages, Grass/shrub overgrowths)

The roads within the immediate vicinity leading to the Substation (passing through the heart of a very, very busy market) are in a completely shambolic state and is a very important hub for trading/commercial activities.



Figure 32: Overgrowths within the Substation premise/Improperly stored transformer oil drums.



Figure 33: Puddle of stagnated water within the Substation premise/Deplorable state of the road leading to the Substation.

4.7.3 b *The Substation Switchyard*

The substation switchyard floor is sparsely graveled and it is not properly maintained. Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.



Figure 34: Broken/Collapsed trench cover slabs within the switchyard (posing potential injury risks Transformer Oil drums lying on the switchyard floor)



Figure 35: Transformer Plinth/Spilled oil from very old transformer(posing risks of ground-water pollution through seepage).

4.7.3 c

The Control Room

The Control room building is very old and decrepit and the working space is rather choked as there is barely enough working space for System operators, however there is an on-going construction of a new Control room under NEGIP.



Figure 36: Exposed cables in the Control Room blocking run-off along the cable trench/Foundation for new Control Room Building being laid.



Figure 37: Fire Extinguishers at the Substation Control Room/Disregard for use of PPEs by Construction workers.

4.7.3 d Waste Management

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segreated into the different waste streams but are dumped haphazardly.

4.7.3 e *Occupational Health and Safety*

There is no trained HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There were Oil leakages and spillages from the transformers in the Substation.

4.7.3 g *Security*

There are security personnel manning the gates and overseeing the premises all through the day (though this could be breached whenever there are disturbances within the vicinity of agitations by the Community).

4.7.3 h *Fire Emergency and Precautions*

Although fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.7.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Rehabilitation Rehabilitation of 132kV Substation, 132kV Control Room, Digital Control System and Replacement of High Voltage Switchgears and Associated equipment.

4.7.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.7.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Re-graveling of the switchyard floor;
- Clearing of grass and removal of scrap materials;
- Replacement of old and weak furniture;
- Upgrade of toilet facilities;
- Delineation/Construction of a scrap/spares yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyard/Substation;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.
- Clean-up and restoration of soil contaminated by oil spills and possible PCB testing and remediation.

4.7.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Aba 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),

- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.8. UMUAHIA 132/33 KV TRANSMISSION SUBSTATION

4.8.1 Project Location

Umuahia 330/132/33 kV Transmission Substation is situated in Umuahia town, the capital city of Abia state, (along Enugu – Port Harcourt express way).

The substation lies within coordinates 7°30' N and 4°30' E of the Equator, though the Substation is located approximately at coordinates 7°48'02.2" N and 4°34'40.1" E in the South-Eastern part of Nigeria.

4.8.2 Environmental and Social Baseline

Umuahia features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C - 30 °C in the city.

The substation is hosted by Nteze Aba Community. The host Community is peaceful and the relations with the Substation is cordial.

Umuahia is densely populated and the predominant occupation in this area is trading and farming and mining.

4.8.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Umuahia 132/33kV substation.

4.8.3 a *The Substation Environment*

Being a relatively new substation (commissioned in 2012), the Substation environment is generally well maintained and visually appealing.

Unused construction materials were stacked away neatly and the premises was literally litter-free.

However, the Substation's drainage system is very poor giving rise to the real threat of erosion within the substation premise if the situation is not addressed.

Also, the intense digging activities by prospector (searching for Kaolin – white coal) around (and within) the immediate surroundings/perimeter of the substation poses a grave threat to the foundations of structures within the substation.

The access road leading to the Substation is tarred and well defined.



Figure 38: Excavation activities on-going Outside the substation.

4.8.3 b *The Substation Switchyard*

The substation switchyard floor is adequately graveled (being relatively new) and very well maintained.

Some of the Cable trench covers slabs are intact (serving the protective purposes intended).

However, lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved upon.



Figure 39: Erosion threat within the switchyard/Installation materials (from an on-going Project) in the switchyard (exposed to the vagaries of elements of weather and thefts).

4.8.3 c *The Control Rooms*

The building structure which houses the Control Room/ Staff Offices is relatively new (commissioned 7 years ago) and properly maintained.

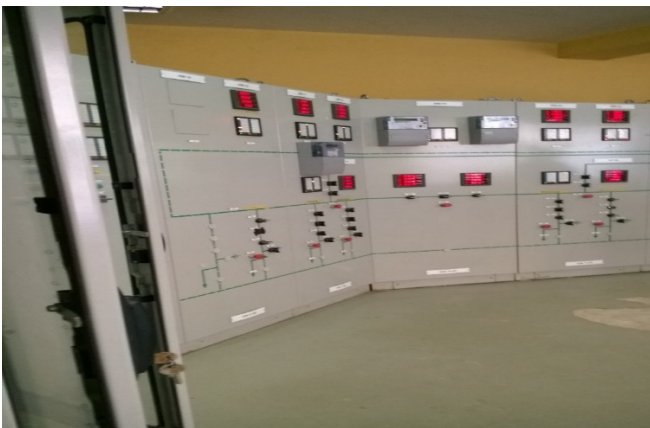


Figure 40: Control panels in the control room.

4.8.3 d *Waste Production and Disposal*

House-keeping in this substation is very good with the substation looking neat and well maintained.

There is a clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment.

4.8.3 e *Occupational Health and Safety*

Though there is an HSE Staff at the Substation, there is no trained Safety Personnel nor were there First Aid kits on site.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate and there are no notices or signs clearly indicating “Danger” areas within the Substation.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There are no Oil leakages from the existing transformers in the Substation.

4.8.3 f *Security*

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

A segment of the Substation perimeter is fenced with wire gauze only (this could be easily breached, especially with the digging activities going on around the immediate vicinity of the Substation).

4.8.3 g *Fire Emergency and Precautions*

Although fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

Also, the transmission substation operators possess little or no training in firefighting/prevention.

4.8.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 100MVA 132/33kV Power Transformers and Extension of 132kV Bus with 3 No. Additional Feeder Bays.

4.8.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.8.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Clearing of grass and removal of scrap materials;
- Delineation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of adequate lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.8.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Umuahia 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.9 ABAKALIKI 132/33 KV TRANSMISSION SUBSTATION

4.9.1 Project Location

Abakaliki 132/33 kV Transmission Substation is situated in Abakaliki (along old Enugu road) which is the capital of Ebonyi State., within Ebonyi L.G.A.

The Substation lies within coordinates 6°18'33.37" North and 8°07'37.45"East of the Equator, sitting approximately 38m (127ft) above sea level.

4.9.2 Environmental and Social Baseline

Ebonyi state was created on October 1, 1996 by the then military government of General Sani Abacha. The state was carved out from parts of Enugu and Abia State respectively. The Area of the Enugu state that was removed to form Ebonyi state is Abakiliki and Afikpo division in Abia State. The state is primarily inhabited by the Igbos and its capital city is Abakiliki.

Ebonyi state is often referred to as the ‘ Salt of the Nation’ for its huge salt deposit at Okposi and Uburu salt lakes. The state shares borders with Enugu State to the West, Abia State to the south, Benue State to the North and Cross River State to the East.

Abakaliki features a tropical wet climate with lengthy and heavy rainy seasons and very short dry seasons. Only the months of December and January truly qualifies as dry season months in the city.

The city experiences its heaviest precipitation during the month of September with an average of 367 mm of rain. On the average, December is the driest month of the year, with an average rainfall of 20 mm. Temperatures throughout the year in the city are relatively constant, showing little variation throughout the course of the year. Average temperatures are typically between 25 °C - 30 °C in the city.

The substation is hosted by Nteze Aba Community (Ebonyi L.G.A.). The host Community is peaceful and the relations with the Substation is cordial.

Abakaliki is densely populated and the predominant occupation in this area is trading and farming and mining.

The people of Ebonyi state are predominantly farmers and traders. The state is mainly an agricultural region. It is the leading producer of crops such as rice, yam, potatoes, maize, beans and cassava in Nigeria.

The fishing industry is also useful to the growth of the economy. The state is blessed with other solid minerals such as lead, crude oil and natural gas. In 2007, Ebonyi state recorded a total GDP of \$2.73billion.

4.9.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Abakaliki 132/33kV substation.

4.9.3 a *The Substation Environment*

Though there are litters of construction equipment, scraps materials and casings noticeable at the substation (resulting from on-going construction works in the substation), wastes are generally properly managed in the substation.

However, there is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Generally, the switchyard is well maintained but the general Substation premise is overgrown with weeds (the rate of weed growth within the Substation premises is rapid due to the long wet season characterized by frequent rains in the area).

The Substation premise is properly drained – no incidences of flooding. However, blockages to drainage channels (which also serve as trench cables).

The access road leading to the Substation is clearly defined, tarred and free of encumbrances. However, the traffic along road is fairly busy.



Figure 41: Adequately maintained switchyard floor/Farming activities within the Substation premise.



Figure 42: Poor storage of unused construction accessories/Dense Overgrowths within Substation premise.

4.9.3 b The Substation Switchyard

The substation switchyard floor is properly maintained and kept free of weed overgrowths. Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.

4.9.3 c The Control Room

The Control Room building structure is old and require refurbishing and proper maintenance (the building is also shared with Ebonyi Electrical Distribution Company). Also, the Control room space is rather choked as there is barely enough working space for System operators and ventilation is very poor.

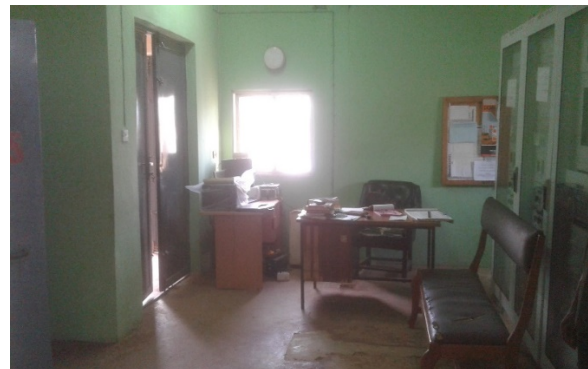


Figure 43: Control Panels in the Control Room/Working area within Substation Control Room.

4.9.3 d Waste Management

Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

Waste management in the transmission substation could be significantly improved as wastes were not sorted/segregated into the different waste streams but are dumped haphazardly.

4.9.3 e Occupational Health and Safety

There is no HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There were no Oil leakages and spillages from the transformers in the Substation.

4.9.3 f Security

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

4.9.3 g Fire Emergency and Precautions

Although fire extinguishing canisters were available on site (all serviced), there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.9.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Upgrade of 1 x 30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment.

Upgrade of 1 x 30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment

4.9.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.9.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Maintenance of effective weed/overgrowths control practiced at the substation;
- Removal and disposal/proper storage of scrap materials;
- Delineation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Refurbishment of the Control Room building;
- Improvement of ventilation in the Control Room;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.9.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Abakaliki 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,

- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.10 GCM 132/33 KV TRANSMISSION SUBSTATION

4.10.1 Project Location

GCM 132/33 kV Transmission Substation is situated in Onitsha, a metropolitan city on the east bank of the River Niger in Ogbaru L.G.A. of Anambra state.

The Substation lies within coordinates 6° 46' East and 6° 07' North, sitting approximately 57m (185ft) above sea level.

4.10.2 Environmental and Social Baseline

The name Anambra was derived from the term “Omambala. This is the igbo name of the Anambra river that flows through the state and is a tributary of River Niger.

The history of Anambra state dates back to the 9th century, when the archeological excavations showed great artistic works in Iron, Copper, Bronze and other materials, which belonged to the ancient kingdom of Nri. These works showed that the kingdom of Nri existed in Anambra and was located on the Anambra River from 948AD to 1911.

Under the rule of the Great Britain, Nri kings were recognized as the legal rulers and in the 19th Century, they were appointed warrant chiefs and given the power to collect taxes and fulfil other duties.

In 1976, the old Anambra state was formed and it was a part of the East Central State with its capital city as Enugu. However, on August 27, 1991, Anambra and Enugu Split and this led to the creation of Anambra state carved out of the old Anambra state.

As is typical of the rain-forest belt within which the proposed project sites lie, average daily maximum temperature is about 28.4°C with daily minimum not falling below 24°C. The seasonal variation is small, being about 10°F between the hottest and the coldest months, which are March and August, respectively.

Rainfall is seasonal with no distinct dry season because of the monthly rainfall all year round, but the period of increased rainfall extends from April to October, with a short ‘dry season’ in August, usually referred to as ‘August break’.

The substation is hosted is hosted by Onitsha Community (Onitsha North L.G.A.) and the host Community is peaceful.

Onitsha is densely populated and the predominant occupation in this area is trading, commerce and fishing.

Anambra state is rich in crude oil, natural gas, bauxite and ceramic. It has fertile land which encourages farming. The state has other resources in form of agro-based activities such as fisheries and also land for pasturing and animal husbandary.

In 2007, the state recorded total GDP of \$11.83billion.

4.10.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at GCM 132/33kV Substation

4.10.3 a *The Substation Environment*

Part of the Substation premises is overgrown with weeds but the Switchyard floor is almost completely weed-free, however it is completely bare of “graveling”.

The Substation premise is properly drained – no incidences of flooding. However, the flow of runoff through the drainage channels (which also serve as cable trenches) in the Substation premises is hindered as a result of Sedimentation and Clogging by cables.

The access road leading to the Substation is clearly defined, tarred and free of encumbrances, though traffic along the road could be chaotic sometimes.



Figure 44: Blocked drainage channel resulting from sedimentation/ Switchyard properly maintained



Figure 45: Construction materials neatly stacked but unprotected (leaving them susceptible to degradation, defectiveness or theft).

4.10.3 b *The Substation Switchyard*

The substation switchyard floor is sparsely graveled, however, it is properly maintained and kept free of weed overgrowths.

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.

4.10.3 c *The Control Rooms*

The existing building housing the Control Room is rather small, very old and poorly maintained and requires refurbishing and proper maintenance.



Figure 46: Very old and ill-maintained building structure housing the Substation Control Room/Decrepit furniture being use by operators.

4.10.3 d Waste Management

Waste management within the Substation premises is very good. There are no litters about and the premises is well kempt and neat.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

4.10.3 e Occupational Health and Safety

There is no HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There are no Oil leakages from the existing transformers in the Substation.

4.10.3 f Security

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

4.10.3 g Fire Emergency and Precautions

There were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.10.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Reinforcement of the Substation with 1 x 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment.

4.10.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.10.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Regraveling of the Switchyard Floor;
- Maintenance of effective weed/overgrowths control practiced at the substation;
- Removal and disposal/proper storage of scrap materials;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Refurbishment of the Control Room/Control Room building;
- Improvement of ventilation in the Control Room;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.10.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at GCM 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.11 OJI 132/33 KV TRANSMISSION SUBSTATION

4.11.1 Project Location

Oji River 132/33 kV Transmission Substation is situated in Oji River town, a Local Government Area of Enugu State in the eastern part of Nigeria. The town is bordered by Anambra and Abia states, respectively.

The Substation lies within coordinates 6°15'27.37' 'North and 7°16' 23.19" East of the Equator, sitting approximately 65m (213ft) above sea level.

4.11.2 Environmental and Social Baseline

Enugu is located in the tropical rain forest zone with a derived savannah. The climate is humid and this humidity is at its highest between March and November. The mean daily temperature in the State is 26.7 °C (80.1 °F).

The area is densely populated and the Communities in this part of the country are generally peaceful and Law-abiding. Other environmental and social baseline data are sam as in 4.3.2.

4.11.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Oji River 132/33kV Substation.

4.11.3 a *The Substation Environment*

There are uncontrolled overgrowths in Substation premise (including the, albeit “thinly” graveled areas within the switch-yard).

The slightly slant nature of the Substation premise aids it to drain properly and there are no incidences of flooding. However, blockages (resulting from sedimentation, overgrowths, clogging) to drainage channels (which also serve as trench cables) could be a problem in future.

Generally, the Substation environment is not visually appealing due to the under-listed:

- Litters of wastes, improperly stored equipment/materials,
- Stagnant bodies of water (resulting from blockages in drainage channels,,
- Grass/shrub overgrowths.

The access road leading to the Substation is clearly defined, tarred and free of encumbrances. However, the drive path within the substation premise is dilapidated and in dire need of rehabilitation.



Figure 47: Equipment/materials and wastes littering the Substation premises/Blocked drainage channel resulting from sedimentation and dumping of waste.



Figure 48: Scantly gravelled Switchyard floor/Scrap (asbestos) generated from on-going Rehab works at the Substation.

4.11.3 b The Substation Switchyard

The substation switchyard floor is sparsely graveled and poorly maintained.

Some of the Cable trench covers slabs are broken thereby leaving current-carrying cables exposed.

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.



Figure 49: Oil leakage at transformer base.

4.11.3 c The Control Room

The existing building housing the Control Room is very old (over 60 years) and dilapidated. The Control room is also quite a distance from the switch-yard.

However, a complete substation rehabilitation is on-going (construction of a new Control Room/Office and Switch-yard rehabilitation).



Figure 50: Very old and dilapidated building structure housing the Control Room for the Substation.

4.11.3 d Waste Management

Waste management within the Substation premises is very very poor. Litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) within the Substation premises thereby creating an unhealthy environment.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

4.11.3 e Occupational Health and Safety

There is no trained HSE Staff stationed at the substation.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There was Oil leakage noticeable from 1No. Transformer (very old) in the Substation

4.11.3 f Security

The Substation is relatively secure as there are security personnel manning the gates and overseeing the premises all through the day.

4.11.3 h Fire Emergency and Precautions

Preparedness in the event of fire is grossly inadequate grossly inadequate.

It pertinent to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.11.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with Reinforcement of 1 No. 60MVA 132/33kV Power Transformers, Switchgears, associated equipment and devices.

4.11.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.11.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Clearing of grass and removal of scrap materials;
- Replacement of old and weak furniture;
- Upgrade of toilet facilities;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyard;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.
- Abatement of oil leakage from old transformer
- Cleanout of choked drainage channels.

4.11.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Oji 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.12 UGWUAJI 132/33 KV TRANSMISSION SUBSTATION

4.12.1 Project Location

Ugwuaji 132/33 kV Transmission Substation is situated in Ugwuaji town in Enugu South L. G. A of Enugu State in Nigeria..

The Substation lies within coordinates 6° 24' 12"North and 7°33' 30' East of the Equator, sitting approximately 180m (590ft) above sea level.

4.12.2 Environmental and Social Baseline

Enugu is located in the tropical rain forest zone with a derived savannah. The climate is humid and this humidity is at its highest between March and November. The mean daily temperature in the State is 26.7 °C (80.1 °F).

Other environmental and social baseline data are as in 4.3.2.

4.12.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Ugwuaji 132/33kV Substation.

4.12.3 a *The Substation Environment*

Generally, the Substation environment is exemplarily visually appealing.

Unused construction materials were stacked away neatly and the premises was literally litter-free.

The Substation premise is well drained, with no incidences of flooding being experienced.

The access road leading to the Substation is untarred and very dusty. This could be a problem during the rainy season as the road would be all muddy and soggy which will hinder smooth vehicular movement and transportation of construction materials

Also, the access road passes through the heart of the host community and a very busy village market.

4.12.3 b *The Substation Switchyard*

The substation switchyard floor is adequately graveled (being relatively new) and very well maintained.

Some of the Cable trench covers slabs are intact (serving the protective purposes intended).

However, lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved upon.



Figure 51: Properly maintained Switchyard floor/(well- gravelled and free of grasses or shrubs)/ Trench cover slabs intact, protecting power cables (eliminating the risks of accidental shock/electrocution).

4.12.3 c *The Control Room*

The building structure which houses the Control Room/ Staff Offices is relatively new (completed about 6 years ago) and properly maintained.



Figure 52: Sparse First Aid kits in the First Aid box at the substation/Old and weak office furniture available for use by operators.



Figure 53: Restroom used by operators in a state of poor/Serviced fire extinguishers ready for deployment in the event of fire outbreak.

4.12.3 d Waste Management

House-keeping in this substation is near excellent with the substation looking exceptionally neat and well maintained.

There is a clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment.

4.12.3 e Occupational Health and Safety

Though there is an HSE Staff at the Substation, there is no trained Safety Personnel nor were there First Aid kits on site.

Use Personal Protective equipment (PPEs) is not strictly enforced during routine operations by Staff, although provision of PPEs for Staff use is inadequate and there are no notices or signs clearly indicating “Danger” areas within the Substation.

Adequate First-Aid Equipment/materials were not readily available at the substation.

There are no Oil leakages from the existing transformers in the Substation.

4.12.3 f Security

The Substation is relatively secure (although rather secluded) as there are security personnel manning the gates and overseeing the premises all through the day (though this could be breached whenever there are disturbances by the Community).

4.12.3 h *Fire Emergency and Precautions*

Although fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

Also, the transmission substation operators possess little or no training in firefighting/prevention.

4.12.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 75Mvar Reactor and 1 x 60MVA 132/33kV Power Transformer, High Voltage Switchgears and associated Equipment.

4.12.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.12.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Reinforcement of access road during transportation of construction materials and other associated equipment (especially during the wet season);
- Replacement of old and weak furniture;
- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyard;
- Provision of adequate and standard PPEs for staff and visitors alike;
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.12.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Ugwuaji 132/33kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

4.13 OTUKPO 132/33KV TRANSMISSION SUBSTATION

4.13.1 Project Location

Otukpo 132/33 kV Transmission Substation is situated in Otukpo town in Benue State in Nigeria.

The Substation lies within coordinates 4° 46' 38" North and 7° 0' 48" East, sitting approximately 16m (52ft) above sea level.

4.13.2 Environmental and Social Baseline

The environmental and social baseline data are sam as in 4.2.2.

4.13.3 Audit Findings at the Substation.

This subsection presents the findings of the audit conducted at Otukpo transmission substation.

4.13.3 a *The Substation Environment*

The Substation premise has very well maintained, although there are a few noticeable patches of weeds and overgroths around the premise.

If not checked, there is a possible threat of erosion ravaging the substation promise

The access road leading to the Substation is clearly defined, tarred and free of encumbrances.

4.13.3 b *The Substation Switchyard*

Lightening in the switchyard (and the substation premise altogether) is not adequate and needs to be improved.



Figure 54: Properly maintained Switchyard floor

4.13.3 c *The Control Room*

The building housing the control room is well maintained and the Control Room is spacious with available space for future expansion.

4.13.3 d *Waste Management*

House-keeping in this substation is very good with the substation looking neat and well maintained.

4.13.3 e *Occupational Health and Safety*

Waste management within the Substation premises is very good. There are no litters about and the premises is well kempt and neat.

There is no clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums.

4.13.3 f *Security*

There are security personnel manning the gates and overseeing the premises all through the day.

4.13.3 g *Fire Emergency and Precautions*

Fire extinguishing canisters were available on site (some un-serviced) but there were no smoke detectors, fire alarms, fire hose or water hydrants within the substation. Considering the nature of equipment at the Substation, it can be safely concluded that preparedness in the event of fire is grossly inadequate.

It is also important to note that the transmission substation operators possess little or no training in firefighting/ prevention.

4.13.4 Proposed Intervention under NETAP

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation/Reinforcement with 1 x 150MVA 330/132/33kV and 1 x 60MVA 132/33kV Power Transformers , High Voltage Switchgears with Associated Equipment

4.13.5 Additional Interventions Recommended for Implementation

In addition to the interventions proposed in 4.13.4 above, the following activities are also recommended for implementation to add environmental and social safeguards value to the planned activities and enhance environmental and social sustainability of the project:

- Check Erosion threat in the substation
- Maintenance of effective weed control practiced at the substation;
- Removal and disposal/proper storage of scrap materials;

- Deliniation/Construction of a scrap/spare yard within the Substation premises;
- Construction of water hydrant and installation of fire automatic fire alarm systems at the switchyards;
- Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- Installation of lighting system for the entire substation surrounding;
- Placement of appropriate safety warning signs at designated places within the substation premises;
- Training on fire fighting/prevention;
- Provision of first Aid equipment/materials and training in administration of First Aid.

4.13.6 Potential Environmental and Social Impacts associated with the intervention

The following are some of the potential environmental/social impacts associated with the proposed intervention at Otukpo 330/132kV transmission substation;

- Objects falling on persons,
- Electric shock (working on a live equipment or coming in contact with exposed cables),
- Slips and trips,
- Power outages,
- Traffic congestions (especially due to movement of heavy duty trucks),
- Falls from heights,
- Damage to existing structures,
- Oil spillage,
- Indiscriminate disposal of solid waste,
- Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- Theft of equipment/construction materials,
- Spread of HIV/AIDS and other Sexually Transmitted Infections (STIs),
- Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

CHAPTER FIVE

ENVIRONMENTAL AND SOCIAL IMPACTS AND RECOMMENDED MITIGATION MEASURES

The impacts associated with the proposed interventions at the various Transmission substations under Package 2, Lot 1 of NETAP were classified based on whether they are beneficial or harmful, short term or long term, reversible or permanent.

The Impact/mitigation table presented later in this section includes mitigation measures that address the negative impacts using available technologies and managerial procedures.

The major impacts are those arising from the construction works during rehabilitation of the existing facilities.

5.1: Environmental and Social Impacts during Construction

The impacts associated with the proposed rehabilitation/re-enforcement projects at the Transmission Substations under NETAP Package 2, Lot 1 could be grouped under the following headings; Wastes, Occupational Health & Safety and Socio-economic impacts.

5.1.1a Effluents and Storm water

The rehabilitation project is expected to create open pits due to excavations for equipment foundations and drainage channels. This is a likely source of contamination of surface and ground water bodies. Other substances like transformer oils, paints and other lubricants could also be released into the environment. Besides controlling the release of these substances into the environment it is also recommended that:

1. Samples of discharge waters be taken and analyzed to accurately determine the oil load in the water and other contaminants that are above the standards required by law,
2. Analysis for PCBs should also be undertaken for the wastewater in the oil drain pit,
3. Installation/rehabilitation of the existing the compact gravity oil separator unit,
4. Clearing of the existing drainage systems within the facilities.

5.1.1b Non-Hazardous Waste Materials

Non-hazardous solid waste, especially scrap materials occupy a large area of land, limit accessibility for cleaning and housekeeping, accumulates dust, provide suitable habitats for insects, rodents and reptiles and affect the general appearance and aesthetic considerations. It is recommended to have certain designated areas for collecting scrap materials in each location. These include excavated soil, concrete materials, scrap wood from equipment containers, PVC materials from wraps, pipes and insulation material, trimmings of steel, Metals, wood, cement bags, sand and gravel, scrap cables, garbage from daily activities of workers etc.

Excavations

These include all materials produced from digging to provide space for equipment foundations and support.

The following mitigation measures should be applied to address the impacts due to excavations:

1. All excavations shall be made in accordance with the approved drawings.
2. The sides of all excavations, which might expose personnel or facilities to danger resulting from shifting earth shall be protected by providing slope to the appropriate angle of repose or benching in the sides and ends of the excavation or ladders must be used and secured, enough to withstand at least 1 meter above the top of the excavation.
3. All excavation deeper than 1.5 meters must have barriers and toe boards around the outside to-prevent persons and material falling into the excavation. Barriers must be of a strength that is capable of withstanding the weight of a person falling against the barrier. Barriers shall be readily visible by day or night.
4. All persons in excavation must wear safety helmets and safety boots
5. Vehicles and other machineries or construction equipment must not be allowed to come within 2 meters of an excavation unless working in connection with the excavation.

Monitoring Activities for Excavations

- i. An inspection must be conducted at the end of the work to ensure that the excavation has been left in a safe manner. Heavy loads shall not be put on the edge of the excavation.

- ii. The observer must conduct monitoring of the safety tools for the workers and the vehicles restrictions along the excavation and trenching sites.

Reporting

The observer should report accidents or the worker's non-compliance on a monthly basis.

Building Materials

The rehabilitation of control room buildings will usually involve complete or partial demolition of the existing one. Though most TCN control room buildings have concrete roofs, the following measures have been put in place to address minor incidences of Asbestos handling;

All Asbestos materials should be collected in suitable double air tight PE bags with adequate thickness to bear the asbestos waste. The waste removal and soil clean-up should be undertaken by a professional asbestos contractor. The procedures to be followed in such activity normally includes:

- i. Wetting all waste items and underneath soil before any handling,
- ii. Careful placement of wet asbestos waste in suitable container bags,
- iii. Cutting large items should be avoided unless they couldn't be fitted in the containment. In such cases the cutting tool should be carefully selected to suit cutting wet materials,
- iv. Parts of the soil should also be placed in containers bag in wet condition for cleaning the area.
- v. The waste area should be isolated and all workers involved in removing waste and cleaning the site should wear full protection clothing and respiratory protection.
All cloth used during clean-up should be disposed in double container bags as described above.
- vi. Asbestos waste should be handled and transported by qualified hazardous waste contractors.
- vii. Clear warning signs should be fixed inside and outside the affected room.

Any maintenance practices, such as cleaning nearby shelves or using sharp tool in a nearby fixture, within these buildings should consider the following precautions;

- viii. The area of maintenance should be isolated and provided with portable ventilation equipment,
- ix. By all means, sawing, sanding and drilling asbestos is prohibited,

- x. In case accidental disturbance occurred to an asbestos surface the area should be evacuated,
- xi. Only workers wearing full protective cloth and respiratory protection could enter the area for repairing the damaged part either through encapsulation in plaster or latex paint and adequately wet any asbestos waste which should be collected, along with contaminated cloth, in double thick air-tight plastic bags. In such cases air sampling should be undertaken to ensure that the damage has been effectively repaired,
- xii. All above measures should be supervised by HSE staff that has received professional asbestos training,
- xiii. The wastes generated shall be contained in a concrete box and stored in hazardous waste designated area since no engineered sanitary landfill is available in Nigeria.

It is important to adequately manage solid wastes because of their potential to carry hazardous wastes and also cause negative visual impacts. The following mitigation measures are recommended to reduce the significance of the impacts of solid wastes:

1. Use of only officially designated disposal sites by the Contractor for all construction wastes,
2. Use of appropriate disposal trucks for the evacuation and disposal of construction wastes,
3. The contractor should ensure that the trucks are not overloaded and that the waste is adequately contained inside the rear box or covered to prevent dust or particles movements from the truck,
4. The Evacuation and disposal of wastes from the substation must be properly supervised,
5. The on-site waste accumulation area (WAA) in the substation shall be designed to accommodate the expected amounts and different types of wastes. It should be covered and provided with adequate flooring for possible access of forklifts and small trucks. EHS officer should keep separate areas for each type of waste, keep internal passages inside the WAA for facilitating access and should order for regular cleansing of the area. Records of the admitted waste shall be kept in a register and before the WAA is full.

To achieve the above objectives it is recommended that the Contractor should;

1. Develop an inventory for non-hazardous scrap materials for each site. This will help quantify the volume of such wastes and facilitate proper handling and disposal.
2. Provide waste collection bins at selected points. The bins should be designated for each type of waste based on the waste segregation code provided below;

- i. **Green** – recyclable non-hazardous materials
 - ii. **Blue** – non-recyclable, non-hazardous materials
 - iii. **Red** – all hazardous waste materials
 - iv. **Yellow** – clinical wastes for incineration
3. Conduct Training on waste handling and disposal for the substation personnel (especially the HSE team) and construction workers,
 4. Establish designated waste storage sites and disposal at these sites should be closely monitored to ensure prompt evacuation, to avoid over-spills at waste sites that fill quickly.
 5. An authorized waste handling firm be appointed to evacuate the waste from the disposal site at regular intervals.

Air Emissions

Air emissions are expected to be associated with Excavation, filling, loading, transportation and unloading of soil and raw materials. Though these are temporary, they tend to raise the particulate matter concentration on ambient air. Other sources of air emissions during construction include exhaust fumes from vehicles at the work site. The extent of these emissions depends on the number, type and condition of the machinery working at the site at every point in time as well as the climatic conditions. The amount of dust that would be generated is not high as the soil in the project areas is not the loose type and the roads are laid with asphalt. The impact is thus regarded as Minor.

Proposed Mitigation measures

The following measures will significantly mitigate these impacts due to air emissions:

- i. Store construction materials in pre-identified storage areas,
- ii. Cover friable materials during storage,
- iii. Regulation of speed to a suitable speed (30 km/h) for all vehicles entering the site.
- iv. Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume.
- v. Using locally available materials whenever possible thus limiting the travel distance.
- vi. Reducing the distance and number of trips will result in an overall reduction in in gaseous and carbon emissions.

Monitoring Activities

An inspection must be conducted on implementation of the site rehabilitation management plan.

Reporting

The observer should report on the status of the implemented rehabilitation plan monthly basis.

Noise Emissions

Noise at construction sites are quite different from the normal kind of noise experienced in the general workplace. This is mainly due to the different activities that go on at every point in time at a construction site. The noise could be due to construction equipment, possible hammering and drilling works in addition to the noise generated from construction related trucks. The permitted noise levels are 55 Decibel during the day (7am-10pm), and 45 Decibel during the night (10pm-7am).

However, noise from the substation sites during construction is not likely to affect residents due to the distance of most substations from residential buildings. The impact of noise emissions is considered medium level 2 at the substation due to the relatively short period of rehabilitation phase.

Construction workers could, however, be exposed to relatively high levels of noise because of their nearness and continuous presence within the vicinity where the noise is generated. This could be mitigated through application of the normal precautions normally taken by construction labor. Impacts due to construction noise is therefore classified as a Minor Impact (level 3), which could be further minimized and fully controlled if construction workers used safety gear as recommended in the ESMP.

Proposed Mitigation measures

- i. Workers that operate noisy machines and nearby workers should be supplied with earmuffs and should be instructed to put them on when they get into noisy zones.

Contractors should be responsible to instruct their workers to abide to this rule, and the site supervisor should make sure the Contractor is compliant with this rule.

- ii. Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits,

- iii. Coordinating and Informing inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.
- iv. Avoidance of construction activities at night.

Monitoring activities:

Use of appropriate PPEs by all construction workers working in noisy areas shall be conducted during the routine quarterly monitoring activities.

Reporting

Monthly Reporting - The monthly report should include how well the contractor abide by the above measures and any comments, observations or complaints about high noise levels.

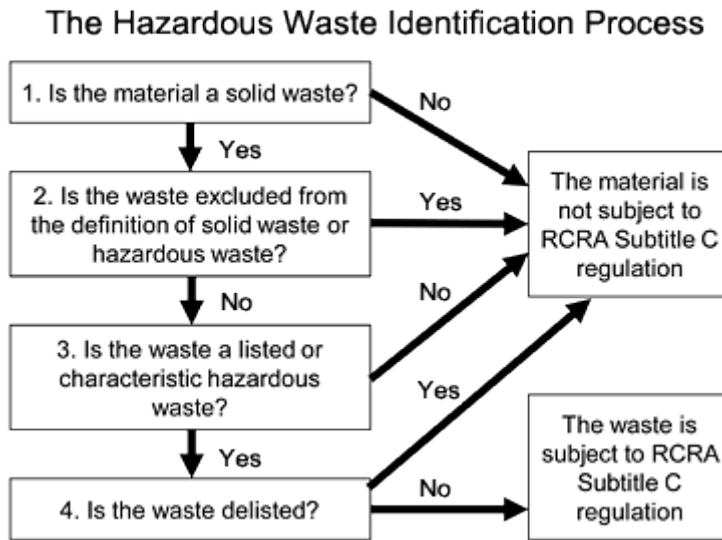
5.1.1c Hazardous Wastes

The waste segregation process recommended above will separate wastes at the respective substations into hazardous and non-hazardous wastes. The subsection **5.1.1b** above deals with non-hazardous wastes during construction works.

This sub-sections addresses wastes with properties that make them dangerous or capable of having harmful effects on human health or the environment. The following questions should be asked in determining whether a waste fills in this category or not;

- i. Is the material in question a solid waste?
- ii. Is the material excluded from the definition of solid waste or hazardous waste?
- iii. Is the waste a listed or characteristic hazardous waste?
- iv. Is the waste delisted?

The chart below shows the flow in the query to determine whether a material/substance is hazardous or not;



- Step 1: - Determines if the material is a solid waste
- Step 2: - Decides whether the waste is specifically excluded from the list of hazardous solid wastes.
- Step 3: - Investigates whether or not the waste is a listed or characteristic hazardous waste.
- Step 4: - Confirms if the waste in question is delisted from the accredited list of hazardous wastes.

A hazardous Waste Management System should be established at each substation to ensure effective management of hazardous waste substances associated with the rehabilitation project. This will ensure that hazardous wastes are managed safely from the time they are generated through while they are transported, treated, and stored, until they are disposed.

Hazardous Waste Generation

The wastes generated during the rehabilitation/re-enforcement projects under NETAP Package 2 must be properly screened to determine whether they are hazardous or not. The Contractors must oversee the ultimate fate of the wastes they generate in the course of the implementation of the NETAP projects. In this regard, all NETAP Contractors **MUST** properly and fully document that the hazardous waste that they produce is properly identified, managed, and treated prior to recycling or disposal.

Hazardous Waste Transportation

Hazardous waste transportation involves all the processes of moving the waste after it is generated to when it is disposed. This includes movement to where it is treated, stored or disposed. It is the duty of the Contractor to ensure that the waste transporter complies strictly with the appropriate regulations regarding waste transportation in Nigeria.

Hazardous Waste Recycling, Treatment, Storage and Disposal

A good number of hazardous wastes can be recycled safely and effectively. This has the benefit of reducing the consumption of raw materials and the volume of waste materials that must be treated and disposed. Other wastes must, however, be treated and disposed of in landfills or incinerators.

Failure to comply with the appropriate regulations governing waste treatment, storage, recycling and disposal might cause spills, leaks, fires, and contamination of soil and drinking water. To encourage hazardous waste recycling while protecting health and the environment, the United States of America Environmental Protection Agency (EPA) developed some guidelines to ensure recycling would be performed in a safe manner.

Generally speaking processes that handle large volumes of waste usually present a higher degree of risk.

Mitigation Measures

A hazardous waste management plan should be put in place to direct actions to be undertaken to ensure environmentally sound management of hazardous wastes. The plan must specify the roles and responsibilities of the client and the Contractor as well as the mode of identification of hazardous wastes, safe handling, collection point and appropriate training for staff involved in its management and disposal.

General Guidelines for Handling Hazardous Wastes

It is totally prohibited to dump or dispose of any hazardous wastes in uncertified sites or use uncertified means of transporting such wastes. The following guideline will help ensure effective hazardous waste management:

- All hazardous wastes must be recycled or disposed off-site by a licensed hazardous waste contractor as highlighted in more details below:
 - i. Storage containers must be in good condition,
 - ii. The waste placed in the container must be compatible with the container,
 - iii. Containers must be clearly and legibly labeled *Hazardous Waste*, with the chemical name (no abbreviations or chemical formulas) and quantity (percentage) of the contents listed. The label must be firmly attached to the container,
 - iv. Containers must be placed next to or near the process that generates the waste,

- v. Containers **MUST** be kept closed at all times except when adding or removing waste. Do not leave a funnel in the hazardous waste container,
 - vi. Containers must be segregated by hazard class (e.g. acids from bases and flammables),
 - vii. All satellite accumulation areas must be under the control of the operator of the process generating waste,
 - viii. Containers and area must be inspected at least weekly for leakage,
 - ix. Complete appropriate waste manifest forms before leaving the evacuation site.
- Hazardous waste disposal contracts are to be developed and administered by the Hazardous Waste Coordinator.

Management of the waste accumulation area (WAA)

The WAA shall be designed to accommodate for a separate fenced and shaded area for the accumulation of hazardous wastes pending collection – this could be a closed container. The hazardous Material Coordinator is responsible for managing this area and ensuring that:

- i. The area is secure with limited admission and must be signed with the such signages as: “DANGER - HAZARDOUS WASTE STORAGE AREA”; and “UNAUTHORIZED PERSONNEL - KEEP OUT”,
- ii. The area is inspected weekly,
- iii. Hazardous waste is being registered
- iv. Hazardous wastes shall be registered in a hazardous waste register containing the following information:
 - Name and address of the establishment/project.
 - Person responsible for maintaining the hazardous waste register
 - The temporal boundaries for the current data
 - Log of hazardous waste held at the storage area including the common name, the characteristics (physical form) and amount (weight/volume) of waste that is being transported off-site.
 - A map indicating the location of accumulation area.
 - MSDSs and waste analyses used to characterize waste streams.
 - Hazardous waste transportation means
 - waste’s destination and disposal methods

- Waste storage area monthly inspections records and recommendations
- Records of all spill incidents which required implementation of the Spill Emergency plan or any other corrective actions with regards to hazardous waste handling and storage.
- Training records, Manifests and bills of lading for hazardous (and non-hazardous) wastes. These records shall be filed indefinitely in an official file maintained by the Hazardous Materials Coordinator and a duplicate file maintained at the Plant Manager's office.
- v. Clear and correct labels are placed on the different storage containers,
- vi. The containers are inspected monthly for leaks or any other form of damage and are kept in good condition,
- vii. No mixing of different hazardous waste streams is taking place,
- viii. The area is properly shaded from rain and sun heat/light,
- ix. Must have a water supply,
- x. Must be accessed from at least two sides for emergency,
- xxii. Hazardous waste can be stored *in drums*, containing small quantities of liquid and solid waste, in order to be easy to handle and to allow proper segregation of incompatible wastes such as reactive substances.

Hazardous Waste Collection and disposal

Special waste which couldn't be recycled should be disposed of in controlled areas within certified disposal sites. Secured accumulation areas for the collected hazardous wastes (separate or integrated with the WAA) shall be provided on site where necessary with records being kept of the type, amount and date of collection as described above. Transportation of hazardous wastes could be performed quarterly by certified contractors.

Awareness

Project's stakeholders should be aware of the disposal procedure of hazardous wastes and the possible environmental risks associated with them.

Minimization

Waste minimization procedures should be adopted during the operation. The supervisor should make sure that the procedures implemented according to the design measures.

Monitoring Activities:

No monitoring activities are required for construction waste as long as the above mitigation measures are implemented,

There should however be a form prepared by TCN Environment/HSE Department with which the Substation EHS Officer is to keep records of quantities, types of scrap received in the store and the location where it has been received from.

Reporting

The monthly report of the construction contractor should include how well the contractor complied with the above measures and any issues observed by the site supervisor about mismanagement of construction waste during the month under consideration.

The EHS officer should prepare a monthly report including received scrap items, sold and disposed items.

5.1.2 Impacts Associated with Health and Safety

Potential impacts to workers and public health and safety during construction phase of the rehabilitation of the substations are similar to those associated with any construction project involving earth moving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of facilities. These include fall from height, objects falling on persons, slips and trips, electrocution, fire, injuries due to manual handling etc.

Impact significance

Impacts associated with health and safety are significant because most of the activities on site during construction will require interaction of humans with equipment and construction materials. This impact is thus a Major one.

Proposed Mitigation Measures

Both National and IFC EHS general guidelines on occupational health and safety require that:

- i. The contractor should assign a health and safety supervisor who ensures the workers adhere strictly to prescribed H&S procedures,
- ii. The contractor should make health and safety facilities available in the project site,

- iii. Contracts should be registered with the health facilities close to the construction site,
- iv. Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers be enforced,
- v. Harnesses should be provided for all personnel working at height and should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. These should be replaced before signs of aging or fraying of fibers become evident,
- vi. When operating power tools at height, workers should use a second (backup) safety strap,
- vii. Testing structures for integrity prior to undertaking work be enforced,
- viii. A guard should be assigned to ensure that the community people are not stepping into the project sites. He should pay attention to children and aged people,
- ix. A tagging system to identify faulty equipment or equipment under maintenance or installation be established,
- x. Clock-in, clock-out and duty/equipment handing over system be established at all work sites,
Use of only adequately trained personnel be used for any particular task –
- xiii. the Contractor MUST not, under no circumstance, use personnel that are adequately trained or faulty/unsuitable equipment for any task.

Safety of Mechanical Equipment

In addition to the above, the following measures shall be adopted to ensure that all equipment used on site are in good functional state:

- i. All mobile mechanical equipment shall be operated by authorized personnel and has a valid license,
- ii. All equipment shall be checked prior to use by qualified personnel,
- iii. Brakes, lights, tire pressures and batteries shall be inspected before using the equipment,
- iv. Revolving lights must be used for heavy duty vehicles,
- v. The design capacity of any equipment shall never be exceeded. The equipment shall not be modified to alter its capacity,

- vi. All drivers shall have a valid driving license,
- vii. Equipment that could present a hazard to personnel, if accidentally activated during the performance of installation, repair, alteration, cleaning or inspection, work shall be made inoperative prior to state of work,
- viii. Equipment, which is subject to unexpected external physical movement such as rotating, turning, dropping, sliding etc., mechanical and/or structural constraint, shall be controlled to prevent such movement,
- ix. All equipment, which are locked or taken out of service, because of potentially hazardous condition, shall be appropriately tagged indicating the reason for being taken out of service.

5.1.3 Socio-Economic Impacts

Impacts due to Movement of Vehicles and Equipment

Construction activities will involve the movement of personnel, construction materials and equipment to and from the project site. This could cause traffic jams with its attendant social problems that could degenerate into chaos if not properly managed. The increase in the volume of traffic also puts a strain on the road infrastructure leading to the premature wear and tear of same greatest potential for traffic impacts to occur arises during the periods of peak construction activities.

The impact due to traffic could be classified as medium.

Proposed Mitigation measures:

- i. Traffic routes must be prearranged with the Local Government Council.
- ii. Access at entry and exit points to works sites should be controlled and heavy trucks should be assisted by traffic controllers
- iii. Ensure that warning signs are clear and visible at night.
- iv. Limiting the speed within Site.
- v. Place visually clear instructions in areas close to Construction site.

Monitoring activities

The Contractors under the supervision of TCN to be done whenever needed.

Reporting

A monthly report on any observations or complaints about traffic and accidents.

Power Outages

Live equipment may need to be switched off at some point during the rehabilitation/re-enforcement projects to prevent electrocution or personnel or fire /damage of equipment on site. If this is not properly managed in a timely manner it could be of adverse social and economic consequence since our lives and businesses depend largely on availability of power supply.

Mitigation Measures

The following measures have therefore been put in place to mitigate the impacts that may be associated with the blackouts that may be experienced during the rehabilitation projects at the respective sites:

- i. Provision of alternative source of power supply to residents that may be affected by the knocking off of their regular supply channel.
- ii. Sensitization of the impacted customers through radio announcements, newspaper adverts and other public notices.
- iii. An outage plan should be prepared in conjunction with the Contractor and this should be strictly adhered to by TCN and the Contractor.

HIV/AIDS and other STDs

The implementation of the proposed rehabilitation work will result in the gathering of workers of different backgrounds and locations (probably from distant places), many of whom will be away from their families for long periods. Some of these may resort to casual sex which will be provided by willing casual partners who will be attracted by the perceived 'high pay' of the project.

Mitigation Measures

- i. HIV/AIDS awareness/ sensitization campaigns for both Contractors' workers and host communities on the need to use condoms correctly every time they have vaginal, oral, or anal sex and the need to refrain from sharing needles or unsterilized piercing objects.
- ii. Voluntary testing of Contractor workers to establish their HIV/AIDS status.
- iii. Provision of condoms and Anti-Retro-Viral drugs for Contractor workers who need them.

Gender-based Violence (GBV) and Sexual Exploitation and Abuse (SEA)

When a largely male workforce from outside a community is housed and/or working near the community, the potential for sexual activity between workers and local women exists. Experience on shows that the situation has the potential to result in instances of gender-based violence and sexual exploitation and abuse of women and children. ESMPs must include mitigation measures to prevent GBV and SEA as well as monitoring and reporting measures to ensure that if it occurs, it is promptly brought to the attention of management and the proper authorities.

Mitigation Measures

- i. Minimize influx through giving local communities first priority when hiring unskilled workers and, to the extent qualified applicants are available, semi-skilled and skilled workers
- ii. Measures to avoid SEA, GBV, or other social conflict, required to be listed in the Contractors Environmental and Social Management Plan (CESMP) should also include:
 - mandatory awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
 - awareness-raising to sensitize host communities, with special attention to women, about the social and health risks of sexual engagement with the workforce;
 - informing workers about national laws that make sexual harassment, exploitation of children, and gender-based violence a punishable offence which is prosecuted and which will be reported to the authorities;
 - developing a Worker Code of Conduct to be made a part of employment contracts, and including sanctions for non-compliance (e.g., termination), and
 - Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
- iii. TCN and contractor consult with local community representatives including women regarding potential for SEA or GBV and appropriate measures to prevent and respond to it;
- iv. TCN ensure that contractor's GRM is robust and operating.

- v. Ensure that implementation of the CESMP, including labor management plan are enforceable provisions of the construction contract.

The table (Table 9) below shows the identified potential impacts associated with the proposed rehabilitation/re-enforcement projects at Alaoji, Apir, New Haven, Port Harcourt (Main), Port Hacourt (Town), Itu, Aba, Umuahia, GCM, Abakaliki, Ugwuaji Oji River and Otukpo Transmission Substations, the proposed mitigation measures and other safeguard interventions that will complement the proposed projects at the respective substations;

Table 9: Impact/Mitigation Table (for NETAP Substations Upgrade/Reinforcement).

S/N	CLASS OF ASSOCIATED IMPACT	POTENTIAL SPECIFIC IMPACT	TIMING OF OCCURENCE	FREQUENCY /DURATION	SIGNIFICANCE OF IMPACT	PROPOSED MITIGATION MEASURES	ESTIMATED COST OF MITIGATION (USD)
1	Wastes	Storm water	During civil works at the beginning of the project (After rains).	Throughout the rainy season One month	Medium	<ul style="list-style-type: none"> ○ Construction of storm-water drains from the point of discharge; ○ Clearing of all existing drainage channels within the project site; 	3,000.00 1,000.00
		Effluents	Release of waste fluids from transformer oil filtration process, paints, grease etc. (Installation).	8 months	Major	<ul style="list-style-type: none"> ○ Effluents should be collected into impervious collectors at the point of discharge; 	1,000.00
		Excavations	Beginning of project (civil works).	6 months	Minor	<ul style="list-style-type: none"> ○ Clean-up and restoration of excavation sites IMMEDIATELY the equipment foundations are erected. 	1,000.00

	Building Materials	Beginning of project and during all civil works	6 months	Major		
	Other non-hazardous wastes	During installation	8 months	Medium	<ul style="list-style-type: none"> ○ Provision of waste collection bins at appropriate places within the project site. ○ Segregation of wastes based on the agreed colour codes. ○ Prompt collection and disposal of wastes at designated dump sites by appropriate waste collectors. 	<p>3,000.00</p> <p>1,000.00</p> <p>1,000.00</p>
	Hazardous Wastes (PCBs) and other hazardous substances.	Decommissioning of equipment (Transformers/s witchgears, CTs) to be replaced.	1 months	Major	<ul style="list-style-type: none"> ○ If PCB contamination is detected on testing of Transformer Oils, Oil contaminated soils/water sources refer to PCB Protocol in Annex 3. ○ Keep hazardous products 150 feet or more from your well and preferably to the side or downhill from it, even when all your spills and drips will be contained. ○ Return excess product, spills or drips to the original container. Collect waste paint, solvents, antifreeze, oil and grease, and other hazardous chemicals for community recycling. Dispose of 	
		During installation	8 months			

					<p>pesticide container rinse water by spreading it on fields or lawns at the proper application rate.</p> <ul style="list-style-type: none"> ○ Contain any unusable wastes, spills and drips for appropriate disposal. ○ Locate all hazardous waste products and activities, including mixing and storage, on a surface which will prevent spilled materials from entering ground water. The cumulative effects of small spills may have as great an impact on ground water as a larger spill. ○ Segregate different types of waste in storage to prevent dangerous chemical reactions that could release the products. ○ Have emergency equipment, such as adsorbents and shovels, ready to contain spills. 	<p>5,000.00</p> <p>1,000.00</p> <p>1,000.00</p>
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2	Emissions	Air Emissions	<ul style="list-style-type: none"> ○ During site clearing ○ Movement of vehicles on un-tared access roads ○ From exhaust fumes of project vehicles 	1 month	Minor	<ul style="list-style-type: none"> ○ Surface <u>access roads</u> and on-site roads with <u>aggregate</u> materials, wherever appropriate. ○ Minimize the amount of disturbance and areas cleared of vegetation. ○ Reduce project-related <u>greenhouse gas</u> emissions in a manner appropriate to the nature and scale of project operations and impacts. ○ Enact fugitive dust and vehicle emission controls. ○ Use <u>dust abatement</u> techniques on unpaved, un-vegetated surfaces to minimize airborne dust during earthmoving activities, prior to clearing, excavating, backfilling, compacting, or grading, and during blasting. ○ Establish and enforce speed limits to reduce airborne fugitive dust. ○ When feasible, shut down idling construction equipment. ○ <u>Revegetate</u> disturbed areas as soon as possible after disturbance. 	3,000.00
		Noise Emissions					Minor

						<ul style="list-style-type: none"> ○ Remove people from the vicinity of noisy work. For example, use a machine mounted breaker on an excavator with a good quality cab and exclude other people from the area while the breaker is in use. ○ Select quiet equipment. For example, compare noise levels from power tools when buying or hiring equipment. Use information from the manufacturer or supplier, and choose the quietest tools that are effective for the job. You can also reduce noise when selecting other types of tool. For example, choose plastic or rubber hammers, rather than metal, to free collars on falsework legs. ○ Use of appropriate PPEs (Ear muffs). 	
3	Health and Safety	Fall from Height	During installation	8 months	Major	<ul style="list-style-type: none"> ○ Identify all Fall Hazards on site ○ Communicate the potential fall hazards to all workers/visitors on site through tool-box talks and training ○ Provide appropriate PPEs for all personnel exposed to any particular fall height associated with their tasks <p>Enforce compliance with fall hazard</p>	

						<p>prevention protocol established for the project through appropriate supervision and use of PPEs.</p>	
		Objects falling on persons	During installation	8 months	Major	<ul style="list-style-type: none"> ○ Avoid working under unstable, suspended equipment/materials ○ Use of Appropriate PPE (Hard Hat). ○ Effective supervision of workers if work must be done under such conditions. 	
		Slips and Trips	<p>Mostly during civil works (excavation of foundation pits).</p>	3 months	Major	<ul style="list-style-type: none"> ○ Design of workplace & work processes that eliminate or reduce exposure to Slips & Trips <i>(Design workplace & processes to prevent potential exposures to slip & trip hazards)</i> ○ Good housekeeping <i>(Maintain clear, tidy work areas free of clutter).</i> ○ Safe walking practices <i>(Follow safe walking practices & routes).</i> ○ Wearing proper footwear <i>(Wear proper footwear with good traction).</i> 	<p>1,000.00</p> <p>1,000.00</p>

						<ul style="list-style-type: none"> ○ Contain work processes to prevent discharge, splatter, or spillage of liquids, oils, particles, dusts & offal onto floor (<i>Local exhaust ventilation, Extraction/collection systems, Enclosures, Work surfaces with raised or lipped edges, Catch/drip pans, drain-offs</i>). ○ Use drip trays to contain leaks of lubricant onto floor from machinery ○ Perform regularly scheduled maintenance ○ Use adequate ventilation to avoid smoke, steam & condensation of water & grease onto floor ○ Provide adequate lighting to keep work areas, aisles & paths of travel well lit ○ Mark/highlight step edges & transition areas (changes in elevations) ○ Use anti-skid paint, slip-resistant coatings & strips ○ Ensure stairs have sufficient lighting & hand rails 	<p>1,000.00</p> <p>1,000.00</p> <p>3,000.00</p> <p>1,000.00</p> <p>3,000.00</p>
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						<ul style="list-style-type: none"> ○ Provide effective drainage, false floors or work platforms ○ Install slip-resistant floors in high risk areas. 	1,000.00
						<ul style="list-style-type: none"> ○ Provide effective drainage, false floors or work platforms ○ Install slip-resistant floors in high risk areas. 	1,000.00
		Injuries due to manual handling	Throughout the project but more likely during civil works and installation.	18 months.	Medium	<p>Appropriate mechanical equipment should be used for lifting heavy items</p> <p>If manual lifting must be done then:</p> <ul style="list-style-type: none"> ○ Get a secure grip. ○ Use both hands whenever possible. ○ Avoid jerking by using smooth, even motions. ○ Keep the load as close to the body as possible. ○ To the extent feasible, use your legs to push up and lift the load, not the upper body or back. ○ Do not twist your body. Step to one side or the other to turn. ○ Alternate heavy lifting or forceful exertion tasks with less physically demanding tasks. ○ Take rest breaks. 	

						<p>When working with Power Tools:</p> <ul style="list-style-type: none">○ Never carry a tool by the cord or hose.○ Never yank the cord or the hose to disconnect it from the receptacle.○ Keep cords and hoses away from heat, oil, and sharp edges.○ Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.○ Keep all people not involved with the work at a safe distance from the work area.○ Secure work with clamps or a vise, freeing both hands to operate the tool.○ Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.○ Maintain tools with care; keep them sharp and clean for best performance.○ Follow instructions in the user's manual for lubricating and changing accessories.	
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						<ul style="list-style-type: none"> ○ Be sure to keep good footing and maintain good balance when operating power tools. ○ Wear proper apparel for the task. Loose clothing, ties, or jewellery can become caught in moving parts. ○ Remove all damaged portable electric tools from use and tag them: "Do Not Use." 	
		Electric Shock	During installation	8 months	Major	<ul style="list-style-type: none"> ○ A tagging system to identify faulty equipment or equipment under maintenance or installation be established. ○ Clock-in, clock-out and duty/equipment handing over system be established at all work sites ○ Use of only adequately trained personnel be used for any particular task - the Contractor MUST not, under no circumstance, use personnel that are not adequately trained or faulty/unsuitable equipment for any task. ○ Proper outage system on live equipment to be worked must be established and enforced. 	1,000.00

4	Socio-Economic	Movement of vehicles and equipment.	Delivery of equipment to site.	1 month	Minor	<ul style="list-style-type: none"> ○ Traffic detour routes must be prearranged with the Local Government Council. ○ ○ Access at entry and exit points to works sites should be controlled and ○ heavy trucks should be assisted by traffic controllers ○ Ensure that warning signs are clear and visible at night. ○ Limiting the speed within Site. ○ Place visually clear instructions in areas close to Construction site. 	1,000.00 500,00
		Power Outage	During installation	Intermittently within 8 months	Minor	<ul style="list-style-type: none"> ○ Provision of alternative source of power supply to residents that may be affected by the knocking off of their regular supply channel. ○ Sensitization of the impacted customers through radio announcements, newspaper adverts and other public notices. ○ An outage plan should be prepared in conjunction with the Contractor 	3,000.00

						and this should and strictly adhered to by TCN and the Contractor.	
	HIV/AIDS and other STIs	Throughout project life	Throughout project life (24 months)	Major		<ul style="list-style-type: none"> ○ HIV/AIDS Sensitization/awareness campaigns/workshops. Sensitization programme should include provision for special targeting of girls and young women, as well sex workers and other At Risk populations around the project area. ○ Voluntary HIV/AIDS testing for Contractor staff. ○ Distribution of condoms. 	50,000.00
	Gender-based Violence and Sexual Exploitation and Abuse	During construction and installation	Throughout project life (24 months)	Major		<ul style="list-style-type: none"> ● Minimize influx through local hiring ● Require the contractor to include in the Contractors Environmental and Social Management Plan (CESMP) measures to avoid SEA, GBV, or other social conflict, including: <ul style="list-style-type: none"> ○ mandatory awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women; 	

						<ul style="list-style-type: none"> ○ informing workers about national laws that make sexual harassment, exploitation of children, and gender-based violence a punishable offence which is prosecuted; ○ Code of conduct to be established for contractor employees and contract workers, acknowledging a zero-tolerance policy towards child labor ; child sexual exploitation as well as Sexual and Gender Based Violence .The code of conduct will be a part of employment contracts for each contractor staff, and will include sanctions for non-compliance (e.g., termination), and ○ Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence. ● TCN and Contractor should consult with local community representatives including women regarding potential for SEA or GBV and appropriate measures to prevent and respond to it. 	
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NETAP

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ESMP (Package 2 – Lot 1)

September, 2019

						<ul style="list-style-type: none">• TCN should ensure that contractor's GRM is robust and operational• Ensure that implementation of the CESMP (or influx management plan if there is one) is an enforceable provision of the construction contract	
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Grand Total (i.e. USD 90,000/site x 13 No. sites) = USD 1, 170,000 .00

CHAPTER SIX

STAKEHOLDERS' CONSULTATIONS/ GRIEVANCE REDRESS MECHANISM (GRM)

This ESMP recognizes that grievances may arise as a consequence of the implementation of the rehabilitation/re-enforcement projects under NETAP Package 2, Lot 1.

Stakeholder Consultation is a veritable instrument which over the years has proven to be very useful medium for information dissemination, communication and feedback garnering.

A Grievance Redress Mechanism on the other hand provides a platform and sets out procedures for effective handling of complaints and grievances which may arise during project implementation (or after completion).

During life cycle of NETAP, Stakeholder consultations would be engaged extensively while a GRM would be set up for the project with the aim of avoiding lengthy delays and litigations which may hinder project implementation/completion and objectives.

6.1: Stakeholder Consultations/Engagement

For the purpose of this ESMP, Stakeholder's consultations were limited to the staff of the substation at this stage since a broader consultation for the NETAP was held at Abuja (*see stakeholder Consultation for NETAP in the Environmental and Social Management Framework – ESMF and Resettlement Policy Framework – RPF for NETAP*).

However, more direct Stakeholder consultations involving the immediate hosts and concerned communities affected by the project site will be conducted just before, during and at the close of the project to ensure a smooth project implementation through a comprehensive Stakeholders' Engagement Plan to be developed for the project by a consultant.

6.1.1 Funding for Logistics of Stakeholder Consultations/Engagement

Funding for Logistic expenses in respect of convening Stakeholders' Consultations/Engagement for NETAP will be drawn from the NETAP Project Funds.

A clear estimate of the costs for carrying out Stakeholder Engagements for NETAP will be known after the Consultant engaged to develop a comprehensive Stakeholder engagement Plan for NETAP concludes his assignment.

6.2: Grievance Redress Mechanism (GRM)

Just like section 6.1 above, a comprehensive Grievance Redress Mechanism will be developed and set up especially for NETAP.

The GRM Document developed by the Consultant will be duplicated and distributed to all TCN Substation sites where NETAP will be implemented for immediate setup (before actual project implementation activities commence)/Implementation.

For all intents and purposes, it will also be very important that all TCN officers that will be responsible for operating the GRM **MUST** be trained in order to achieve effective management of the Redress Mechanism.

6.2.1 Objectives of the GRM

Some key objectives of the grievance redress mechanism are to:

- i. Provide an effective avenue for affected persons to express their concerns and resolve disputes that are caused by the project
- ii. Promote a mutually constructive relationship among PAPs, government and project proponents
- iii. Prevent and address community concerns
- iv. Assist larger processes that create positive social change and
- v. Identify early and resolve issues that would lead to judicial proceedings

6.2.2 Financing the Grievance Redress Mechanism and Cost of Remediation

The TCN-PMU shall be responsible for the funding of logistics for the GRM as well as the eventual compensation or remediation that aggrieved party may be entitled to. The TCN-PMU will also be responsible for the cost of the judicial process for cases that result to court for adjudication.

CHAPTER SEVEN

MONITORING

Environmental and Social monitoring will include visual observations, selection of environmental parameters at specific locations, sampling and regular testing of the relevant parameters. Monitoring will be done at a number of levels. The first level of monitoring of the ESMP will be conducted by the Contractor at work sites during construction/ rehabilitation, under the direction and guidance of the Engineering Consultant who is responsible for reporting the monitoring to the implementing agency. The second level of monitoring of the ESMP will be done by the PIU who will verify the report of the Contractor by directly auditing the implementation of environmental mitigation measures contained in the ESMP and submit quarterly reports on this to the World Bank. The third Level will be done by the World Bank, through appointed external E&S Auditors that will conduct an annual check on the implementation of the ESMP by both the Contractor and the PIU and reports to the Bank for further actions. Instances of GBV or SEA are to be reported immediately to TCN and World Bank.

In addition to this ESMP, the Contractor is expected to prepare a “Contractor’s ESMP” (CESMP) that will be reviewed by the ESU of PMU and cleared by the Bank.

This CESMP shall contain the statement and commitment of the Contractor regarding the sustainable implementation of the rehabilitation/reinforcement project being executed under NETAP.

To ensure that all the measures are applied and that the contractor complies with the requirements of the ESMP, TCN substation Management shall appoint an HSE personnel that will be attached to the Contractor handling the NETAP project. This staff shall be responsible for the day-day supervision of works and ensuring compliance. The site HSE staff shall produce and submit weekly reports to the ERSU-PMU (see sample Monitoring Check-list in Table 11).

The ERSU-PMU shall designate a staff to manage each project site. This ERSU-PMU staff shall review the weekly reports from the TCN substation HSE staff as well as the month HSE reports from the Contractor and conduct a quarterly site assessment and supervision visit to the respective sites. The ERSU-PMU staff shall produce quarterly reports which will be submitted to the World Bank for review and further necessary actions.

Using the quarterly reports submitted by the ERSU-PMU, the Bank safeguards team shall conduct safeguards supervision Missions at intervals to be decided by them and

employ the services of the external E&S Auditor as may be required to address any issues requiring such attention.

7.1: Training

The PIU shall conduct training for all the site HSE personnel that will be responsible for the day-to-day monitoring of the NETAP projects at the respective sites.

The PIU shall also conduct trainings for all TCN officers nominated to manage the GRM to be set up for the for NETAP. These trainings shall include on-shore and off-shore specialized training in environmental management and Occupational Health and Safety. The World Bank Safeguards Team shall also conduct training on the Safeguard Policies of the Bank which will hold at a destination within the country for 5No PMU-TREP E&S, 5No TCN E&S, 16 TCN Regional E&S and 34 TCN Sub Regional E&S personnel.

7.2: Cost of Basic office equipment/Capacity Building for ERSU

The table below shows the cost estimate for off-shore training and basic equipment for monitoring;

Table 10: Estimated cost of basic equipment and training.

S/N	ITEM	SPECIFICATIONS	UNIT COST (USD)	QUANTITY	SUB-TOTAL (USD)
1	Computer Laptops	MacBook Pro 14"	1,800.00	1	1,800.00
2	Desktop Computers	Apple iMac Pro (27-inch with Retina 5K Display, 3.2GHz 8-core Intel Xeon W, 32GB RAM, 1TB SSD) - Space Gray	5,000.00	1	5,000.00
3	Desktop Computers	21. 5-inch (diagonal) 4096-by-2304 Retina 4K display Stunning 5-mm thin design 6-Core 8th-generation Intel Core i5 processor Radeon pro 560x Graphics processor Two Thunderbolt 3 (USB-C) ports 802. 11AC Wi-Fi Magic Mouse 2 Magic Keyboard 1 TB Hard Disc	2,000.00	5	10,000.00

4	Hand-held GPS	Trimble Geo 7X (with software and license)	10,000.00	1	10,000.00
5	Toyota Hilux	(4x4, full option, double cabin, 2019 model)	75,000.00	1	75,000.00
6	Digital Cameras with GPS	24 Mega Pixels, Wi-fi, water-proof, GPS,	400.00	2	800.00
7	Printer	HP PageWide Pro 477dw Color Multifunction Business Printer with Wireless & Duplex Printing (D3Q20A)	500.00	2	1,000.00
9	Training	LOCAL: - OH&S (PMU-TREP (5No), TCN E&S (5No.), TCN Regional E&S (16No), TCN Sub Region (34No); DURATION - 5Days @ USD30,000 X 3 yrs	30000	3	90,000.00
		FOREIGN: - Environmental Planning and Implementation (UNESCO-IHE); DURATION: - 3Weeks; COST: - Including course Fees, Air Tickets, local Transportation) for 5 participants.	20000	5	100000
GRAND TOTAL					293,600.00

It should be pointed out that cost of logistics for planning of and convening stakeholder engagements would be covered by the project funds, while funding for logistics of implementing the GRM (including compensation or remediation that may arise – during and after project implementation) will be the responsibility of TCN.

However, an estimated amount of USD 1, 460,600 is proposed for the mitigation of the potential impacts associated with the rehabilitation/reinforcement project at the project sites.

S/N	SAFEGUARDS ASPECT	SUB-ASPECT	GUIDELINE	OBSERVATION	SAFEGUARDS PERFORMANCE NOTE (Breach/Partial Compliance/Full Compliance).	REMEDIAL ACTION	ENFORCEMENT ACTION/PENALTY
1	Occupational Health and Safety	Working in confined spaces	<ul style="list-style-type: none"> • Adequate lighting in dark working areas. • Provision of smoke extractors. • Installation of industrial fans for adequate ventilation. • Conservation of energy in the work place - Installation of white energy saver bulbs/flood lamps. • Working environment must be safe at all times. • Use of nose masks when working in areas where smoke/dust is generated. 				
2		Working at height	<ul style="list-style-type: none"> • Erection of scaffolds • Use of Harness • Provision of safety net 				

3		Working surfaces	<ul style="list-style-type: none"> • Protruding sharp/pointed edges of equipment 				
4		Lifting/moving heavy equipment/materials	Heavy equipment/materials should be lifted by mechanized means. The weight of the item must be considered in selecting the lifting device to be used for the purpose.				
5		Safety signs/Tagging	Must be displayed at strategic places to guide/warn people of hazards associated with the work going on in the area.				
6	House-Keeping	Provision of waste Bins within the working areas	Waste bins should be provided for collection and handling of wastes within the work area.				

7	Training	Type of Training	<ul style="list-style-type: none"> • Training should address the task required to be executed by the employee. • The duration of the training should be sufficient for the complete delivery of the subject matter. • The training MUST be conducted by a competent/accredited person in the field in question. • The content of the training should address all areas where skill gaps exist. • No personnel MUST be assigned to any task for which he/she has been adequately trained. 				

Table 11: Sample Monitoring Checklist

CHAPTER EIGHT

CONCLUSION

The Federal Government of Nigeria, through the Transmission Company of Nigeria (TCN) is implementing an IDA-financed Nigeria Electricity Transmission Project (NETAP) that will be national in scope but with focus on the north-Eastern and south-western parts of the country as part of efforts to improve the capacity and efficiency of the transmission network and increase access to electricity services. The project will involve upgrade/reinforce of existing Transmission Substations as well as upgrade existing Transmission Lines.

This ESMP lays out the overall policies for the protection of the environment in Nigeria in line the regulations of the Federal Ministry of Environment and the safeguards policies of the World Bank, identifies the potential impacts associated with the implementation of the proposed intervention projects at these stations, proffers appropriate mitigation measures and assigns responsibilities as well as costs to the tasks required for the sustainable implementation of the projects.

The recommendations proposed for implementation in this ESMP form the backbone for the sustainable implementation of the proposed rehabilitation projects at Alaoji, New Haven and Apir 330/132/33kV Substations and Port Harcourt Main, Port Harcourt Town, Itu, Aba, Umuahia, GCM, Abakaliki, Orji, Ugwuaji and Otukpo 132/33kV Transmission Substations.

It is important to carryout PCB testing and Transformr Oil spill cleanup at the Port-Harcourt Transmission substation to determine any form of PCB contamination and follow-up with appropriate clean-up and restoration measures. The age of the Transformers in question raises the cocern of possible possible contamination.

Strict implementation of these recommendations and application of appropriate sanctions to defaulting Contractors is key in ensuring that these, projects meet the development objectives of the World Bank.

ANNEX I

ANNEX I

PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION				
SUBSTATION REINFORCEMENT AND REHABILITATION				
PACKAGE 1				
		REGION		DESCRIPTION
Lot 1				
To be Managed at Kaduna				
1	North West	Kaduna	Kumbotsho	Reinforcement with 1 x 300MVA 330/132kV Power Transformer, High Voltage Switchgears and Associated Equipment, Replacement of Control and Relay Panel with Digital Control System
2	North West	Kaduna	Dakata	Reinforcement with 1 x 100MVA 132/33kV Power Transformer, Switchgears, Associated Equipment, Digital Control System. Supply & Installation of Additional 3 No. Feeders Bay and Rehabilitation of Control Room
3	North West	Kaduna	Kankia	Replacement of Faulty 1 x 30MVA and upgrading of 1 x 30MVA Transformers to 2 x60MVA 132/33kV Transformers, High Voltage Switchgears and Associated Equipment including Digital Control System
4	North West	Kaduna	Dan Agundi	Reinforcement of 1 x100MVA 132/33kV Transformers, High Voltage Switchgears and Associated Equipment including Digital Control System and Rehabilitation of Control Room

5	North West	Shiroro	Birnin kebbi	Reinforcement with 2 x150MVA 330/132kV and Installation of 1 x 60MVA 132/33kV Power Transformers with associated 3no. Outgoing 33kV Feeders and Rehabilitation of Control Room
6	North Central	Shiroro	Shiroro	Replacement of obsolete Control and Relay Panels with Digital Control System, High Voltage 330kV Switchgears and Associated Equipment
7	North Central	Shiroro	Abuja Central Area	Upgrading of 2x60MVA with 2x100MVA 132/33kV Power Transformer, Rehabilitation of civil structures of the Control Room and Digital Control System
8	North Central	Shiroro	Kainji	Rehabilitation of 330kV Substation, High Voltage Switchgears, Associated Equipment. Rehabilitation of Control Room including Digital Control System
Lot 2				
To be Managed at Lagos				
1	Lagos Area	Lagos	Ijora	Upgrading of 2 x 30MVA with 2 x 100MVA 132/33kV. Rehabilitation of civil structures of the Control Room and Digital Control System.
2	Lagos Area	Lagos	Lekki	Supply & Installation of 1 x300MVA 330/132kV and 2x100MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment
3	Lagos Area	Lagos	Alagbon	Supply & Installation of 1 x300MVA 330/132kV, 2 x 100MVA 132/33kV Power Transformers, Switchgears and Associated Equipment.
4	Lagos Area	Lagos	Alausa	Reinforcement of 1 x 100MVA 132/33kV Power Transformer, High

				Voltage Switchgears and Associated Equipment
5	Lagos Area	Lagos	Akoka	Rehabilitation of Building structure and Sinking surrounding area, Replacement of obsolete 132kV equipment, 33KV Metal clad Switchgears, Control & Relay panel and Reinforcement with 1x 60MVA 132/33KV Power Transformer. Also refurbishment of the 2x 45MVA transformers and GIS components
6	Lagos Area	Lagos	Amowu Odoffun	Rehabilitation of Building structure and Sinking surrounding area, Replacement of obsolete 132kV equipment, 33KV Metal clad Switchgears, Control & Relay panel and Reinforcement with 2x 60MVA 132/33KV Power Transformer. Also refurbishment of the 1x 30MVA transformers and GIS components
7	Lagos Area	Lagos	Itire	Rehabilitation of Building structure and Sinking surrounding area, Replacement of obsolete 132kV equipment, 33KV Metal clad Switchgears, Control & Relay panel and Reinforcement with 1x 60MVA 132/33KV Power Transformer. Also refurbishment of the 1 x 40 & 60MVA transformers and GIS components
8	Lagos Area	Lagos	Otta TS	Upgrading of the 1 x 30MVA and 1 x 40 MVA with 2 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment
9	Lagos Area	Lagos	Maryland	Upgrading of 2 x 30MVA to 2 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment

10	Lagos Area	Lagos	Egbin	Replacement of obsolete Control and Relay Panels with Digital Control System, Rehabilitation of Control Room, High Voltage Switchgears and Associated Equipment
PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION				
SUBSTATION REINFORCEMENT AND REHABILITATION				
PACKAGE 2				
		REGION		DESCRIPTION
Lot 1				
1	South East	Port Harcourt	Alaoji	Rehabilitation of 330kV Substation, Control Room, Digital Control System and Replacement of High Voltage Switchgears and Associated equipment
2	South East	Port Harcourt	Aba	Rehabilitation of 132kV Substation, 132kV Control Room, Digital Control System and Replacement of High Voltage Switchgears and Associated equipment
3	South East	Port Harcourt	Port Harcourt Main	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment
4	South East	Port Harcourt	Port Harcourt Town	Reinforcement with 1 x 100MVA 132/33kV Power Transformers, Control Room, High Voltage Switchgears and Associated Equipment
5	South South	Port Harcourt	ITU TS	Reinforcement with 1 x 60MVA 132/33kV Power Transformers, Rehabilitation of Control Room including Digital Control System, High Voltage Switchgears and Associated Equipment
6	South East	Enugu	New Haven, Enugu	Reinforcement with 1 x 150MVA 330/132/33kV, 2 x 60MVA Transformers with Associated Equipment, Replacement of High Voltage Switchgears and

				Rehabilitation of Control Room with Digital Control System.
7	South East	Enugu	GCMTS Onitsha	Reinforce with 1 No. 60MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment
8	South East	Enugu	Abakaliki	Upgrade of 1 x 30MVA to 60MVA 132/33kV Power Transformer, High Voltage Switchgears and Associated Equipment
9	South East	Enugu	Orji River	Reinforcement of 1 No. 60MVA 132/33kV Power Transformers, Switchgears, associated equipment and devices
10	South East	Enugu	Ugwuaji	Supply & Installation of 1 x 75Mvar Reactor and 1 x 60MVA 132/33kV High Voltage Switchgears and associated Equipment
11	North Central	Enugu	Otukpo	Upgrade of 7.5MVA Power Transformer to 1 x 60MVA 132/33kV, High Voltage Switchgears and Associated Equipment
12	North Central	Enugu	Apir, Makurdi	Reinforcement with 1 x 150MVA 330/132/33kV and 1 x 60MVA 132/33kV Power Transformers , High Voltage Switchgears with Associated Equipment
13	South East	Enugu	Umuahia	Reinforcement with 100MVA 132/33kV Power Transformers and Extension of 132kV Bus with 3 No. Additional Feeder Bays
Lot 2				
1	South West	Osogbo	Osogbo	Upgrading of 1x 90MVA with 1x300MVA 330/132kV and Reinforcement with 1x100MVA Power Transformers, High Voltage Switchgears and Associated Equipment and 75MX Reactor including the renovation of control room.

2	South West	Osogbo	Ilorin	Reinforcement with 2 x100MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated Equipment. Construction of New Control Room and Replacement of control & relay panel with Digital Control System (DCS)
3	South West	Osogbo	Ondo	Upgrading of 2 x 30MVA with 2x 60MVA,132/33kV Power Transformers, Replacement of High Voltage Switchgears, Control & Relay panel with Digital Control system and Conversion of 6nos. 33kV Indoor to 8No Outdoor. Rehabilitation of control room
4	South South	Benin	Irrua	Supply and installation of 100MVA 132/33KV power Transformer and associated Switchgears.
5	South- South	Benin	Delta IV TS	Reinforcement with 1 x 150MVA 330/132kV Interbus Transformer, 1 x 100MVA Power Transformer, High Voltage Switchgears, and Associated Equipment. Replacement of Obsolete Control and Relay Panels with Digital Control System
6	South- South	Benin	Effurun	Replacement of defective 1x 60MVA 132/33kV with a new 1x 100MVA 132/33KV Power Transformer, High Voltage Switchgears, and Associated Equipment with 4 No Additional Feeder Bays
7	South- South	Benin	Benin TS	Reinforcement with 1 x 150MVA 330/132kV Power Transformers and 100MVA 132/33KV Power Transformer, High Voltage Switchgears and Associated Equipment. Replacement of Obsolete Control and Relay Panels with Digital Control System

SUBSTATION REINFORCEMENT AND REHABILITATION				
PACKAGE 3				
		REGION		
Lot 1				
1	North East	Bauchi	Yola	Reinforcement with 1 x 150MVA 330/132kV and 2x 100MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated equipment with 3 No Additional Feeder Bays
2	North East	Bauchi	Mayo Belwa	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
3	North East	Bauchi	Damboa	Reinforcement of 2x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment and Complete Rehabilitation of Substation
4	North East	Bauchi	Damaturu	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
5	North East	Bauchi	Biu	Reinforcement of 1 x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment and Complete Rehabilitation of Substation
6	North East	Bauchi	Maiduguri	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
7	North East	Bauchi	Bauchi	Upgrading of 22.5MVA and 30MVA Transformers to 2X 60MVA 132/33kV Transformers, Rehabilitation of Control Room with Digital Control System and Associated High Voltage Switchgears.

Lot 2				
1	North East	Bauchi	Jalingo	Upgrading from 132kV to 330kV Substation with 1x150MVA, 330/132/33kV Power Transformers and 1 x 100MVA 132/33kV Transformer, High Voltage Switchgears and Associated Equipment. Construction of 330/132kV Control Room
2	North East	Bauchi	Gombe	Reinforcement with 1 x 300MVA 330/132kV and 1x 100MVA 132/33kV Transformers with High Voltage Switchgears, and Associated equipment Bus with 3 No Additional Feeder Bays.
3	North Central	Bauchi	Jos TS	Reinforcement of 1x 300MVA 330/132/33kV & 1 x 100MVA Power Transformers, 330kV High Voltage Switchgears and Associated Equipment. Rehabilitation of Civil Structures of the Control Room and Digital Control System.
PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION				
SUBSTATION REINFORCEMENT AND REHABILITATION				
PACKAGE 3				
		REGION		DESCRIPTION
Lot 1				
1	North East	Bauchi	Yola	Reinforcement with 1 x 150MVA 330/132kV and 2x 100MVA 132/33kV Power Transformers, High Voltage Switchgears, and Associated equipment with 3 No Additional Feeder Bays

2	North East	Bauchi	Mayo Belwa	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
3	North East	Bauchi	Dambo	Reinforcement of 2x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment.and Complete Rehabilitation of Substation
4	North East	Bauchi	Damaturu	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
5	North East	Bauchi	Biu	Reinforcement of 1 x 60MVA 132/33kV Power Transformers, High Voltage Switchgears, Associated Equipment.and Complete Rehabilitation of Substation
6	North East	Bauchi	Maiduguri	Reinforcement with 1Nos. 150MVA 330/132kV power Transformers, High Voltage Switchgears, and Associated Equipment with 3 No Additional Feeder Bays
7	North East	Bauchi	Bauchi	Upgrading of 22.5MVA and 30MVA Transformers to 2X 60MVA 132/33kV Transformers, Rehabilitation of Control Room with Digital Control System and Associated High Voltage Switchgears.
Lot 2				
1	North East	Bauchi	Jalingo	Upgrading from 132kV to 330kV Substation with 1x150MVA, 330/132/33kV Power Transformers and 1 x 100MVA 132/33kV Transformer, High Voltage Switchgears and Associated Equipment. Construction of 330/132kV Control Room

2	North East	Bauchi	Gombe	Reinforcement with 1 x 300MVA 330/132kV and 1x 100MVA 132/33kV Transformers with High Voltage Switchgears, and Associated equipment Bus with 3 No Additional Feeder Bays.
3	North Central	Bauchi	Jos TS	Reinforcement of 1x 300MVA 330/132/33kV & 1 x 100MVA Power Transformers, 330kV High Voltage Switchgears and Associated Equipment. Rehabilitation of Civil Structures of the Control Room and Digital Control System.

PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION		
SUBSTATION REINFORCEMENT AND REHABILITATION PACKAGE 4		
SUPPLY OF POWER EQUIPMENT		
1	Supply of Power Equipment to Ojo	3 x 150MVA, 10 x 100MVA, 10 x 60MVA and Earthing Transformers
2	Additional supplies to OJO	330kV, 132kV and 33kV Instrument Transformers, Isolators, Circuit Breakers and Insulators

PACKAGE 5				
132kv Line Reconstruction and Reconductoring				
PACKAGE 5A (Lot 1)				
1	South West	Osogbo	Osogbo- Offa -Ganmo - Ilorin	Reconductoring of 150km, 132kV Line Between Osogbo-Offa/Omuaran to Ganmo and Ilorin TS

2	South West	Osogbo	Ayede - shagamu	Reconstruction and Conversion to Double Circuit of Ayede -Shagamu 132kV Line (54km) and Creation of Additional Bays 132kV Line Bays at Ayede and Shagamu.
	South West	Osogbo	Osogbo- Ife / Ilesha	Reconstruction and Conversion to Double Circuit of Osogbo-Ife/Ilesha 132kV Line (39.21 km) and Osogbo-Ilesha 132kV Line Tie-Off (22.1km) and Creation of Additional 132kV Line Bays at Osogbo and Ilesha.
4	South East	Port Harcourt	Afam - PH Main	Reconstruction of Existing Double 132kV Line Circuit to 4 x 132kV Line Circuit Using the Same Right of Way from Afam to Port Harcourt Main (37.8km), and Creating Additional 3 x 132kV Line Bays
5	South East	Port Harcourt	PH Main - PH Town	Reconductoring of 132kV Double Circuit of Port Harcourt Main to Port Harcourt Town 132kV Line (6km)
PACKAGE 5B (Lot 2)				
1	North West	Kaduna	Kumbotso - Hadelja	Reconductoring of Kumbotsho- Hadeji 132kV Line (165km)
2	North West	Kaduna	Kumbotso - Kankia	Reconductoring of Kumbotsho- Kankia 132kV Line (100km)
3	south East	Enugu	Onitsha - Oji River	Reconstruction and Conversion to double circuit of Onitsha- Orji 132kV Line (87km) with Turn In- Turn Out Tower at Nibo in Awka 132kV Substation.

4	south East	Enugu	Alaoji to Aba Town	Reconductoring of Alaoji - Aba Town Double Circuit 132kV line (8km) Including Rehabilitation of Two Nos. Towers along the Line.
5	South South	Benin	Irrua - Benin	Reconductoring of Irrua - Benin 132kV line (81km) with Turn In- Turn Out Tower at Irrua 132kV Substation.
6	South South	Benin	Irrua - Okpila	Reconductoring of Irrua- Okpilai 132kV line (43km) with Turn In- Turn Out Tower at Okpila 132kV Substation.
7	South South	Benin	Okpila - Okene	Reconductoring of Okpilai - Okene 132kV line (65km) with Turn In- Turn Out Tower at Okene 132kV Substation.
8	South South	Benin	Ajakuta-Okene	Reconductoring of Ajakuta- Okene 132kV line (60km)
9	North East	Bauchi	Gombe-Biu-Damboa- Maiduguri	Reconductoring of the Entire Route Length from Gombe - Biu -Damboa - Maiduguri 132kV line of 356km Route Length

PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION		
SUBSTATION REINFORCEMENT AND REHABILITATION		
PACKAGE 6		
SCADA PROJECT		
	SCADA Device	
SUB TOTAL		
	SUPPLY AND INSTALLATION OF SVC	
	SVC to Gombe	

ANNEX II

PROTOCOL FOR THE DECONTAMINATION OF PCB MATERIALS AT TCN SUBSTATIONS.

Polychlorinated Biphenyls (PCB)

Polychlorinated Biphenyls are synthetic chlorinated chemicals. PCBs are generally classified as Persistent Organic Pollutants (POPs) under the Stockholm Convention due to the following properties: high toxicity, persistent in the environment, not biodegradable, accumulative in the fatty tissue of living things and also ability to evaporate and travel long distances through water and air.

PCB Containing materials may include:

- Transformers and Capacitors.
- Old electrical devices or appliances containing PCB capacitors.
- Fluorescent light ballasts.
- Cable insulation.
- Electrical equipment including voltage regulators, switches, re-closers, bushings, and electromagnets.
- Oil used in motors and hydraulic systems.
- Cable insulation.

Due to the different health and environmental risks posed by PCBs exposure, it is essential to develop a step by step approach for its management. The steps below describe actions that should be taken to properly manage PCB contamination at TCN substations;

Step 1 – Testing and Analysis.

To determine if PCB is present in transformer oils, a PCB test will be carried out on the transformers where oil spills and leakages are observed. The test can be carried out using a Chlor-N-Oil kit, a positive result indicates that the oil contains chlorine. However, in order to be determine if it contains PCB and the level of concentration, a gas chromatography analysis on a sample of the transformer oil will be required considering that PCB concentrations in transformer fluid are regulated at less than or equal to **50ppm**.

There are two options to be considered in the management of PCB contaminated transformers, namely decontamination and disposal.

Step 2 – Disposal or Decontamination

2.1 Decontamination

Decontamination is an operation by which the concentration of PCBs in fluids in equipment is reduced. For decontamination to be effective it should result in a residual total PCB concentration of at most 500ppm and ideally less than 50ppm.

- **Mineral Oil Transformers**

Contaminated mineral oil transformers can be decontaminated either by retro filling or on-line chemical treatment. To retro-fill, the PCB contained oil will be replaced with a transformer oil which has a concentration $\leq 50\text{ppm}$ while for on-line chemical treatment, the transformer fluid will be treated chemically to $\leq 2\text{ppm}$. A test will be carried out on the transformer oil after 90 days in service use to determine if the PCBs concentrations have been reduced, this testing applies to both processes. In cases where the PCBs concentration is still high, the transformers should be put up for disposal.

- **Askarel Transformers**

Contaminated Askarel transformers can be decontaminated by treating the transformers. The Askarel will be drained from the transformers and replaced with a leaching fluid through multiple retro-fills or in-situ processing for a period of 18 – 24 months. After 90 days in service use, the transformer will be retested. If the test results show concentrations $\leq 50\text{ppm}$, the transformers will be declassified to non-PCB status and retest annually. If the results are $\geq 50\text{ppm}$ the transformer will be scrapped and disposed.

2.2 Disposal

Disposal is clearly defined as an operation by which PCBs and PCB-contaminated equipment's are destroyed or irreversibly transformed. This process is only considered if the PCBs concentration is still above the standard 50ppm. Disposal of PCB contaminated materials can only be carried out by reputable companies whose sole responsibility is to do so and these materials are only disposed in certified sites.

- **Mineral oil transformers (see illustrations in figure Below)**

When decontamination fails, another option to be considered as earlier stated will be disposal. If the PCB concentration for the transformer oil is between 50 -200ppm, the oil will be carefully drained and the equipment scrapped. If > 200ppm the transformer will be cleaned via solvent degreasing method. The transformer fluids extracted in these two processes will be chemically treated to ≤ 2 ppm, this fluid can be reused or incinerated.

- **Askarel Transformers (see illustrations in Fig. 98 below)**

For Askarel transformers which fail decontamination, the transformers are disassembled and metals undergo a decontamination process which involves solvent cleaning method and autoclave. After decontamination these metals are further tested and they are either recycled or disposed through landfilling. Other porous materials are stored for incineration.

Figure 55: Protocol for the Re-Use, Recycling and Disposal of PCB Contaminated Mineral Oil Transformers

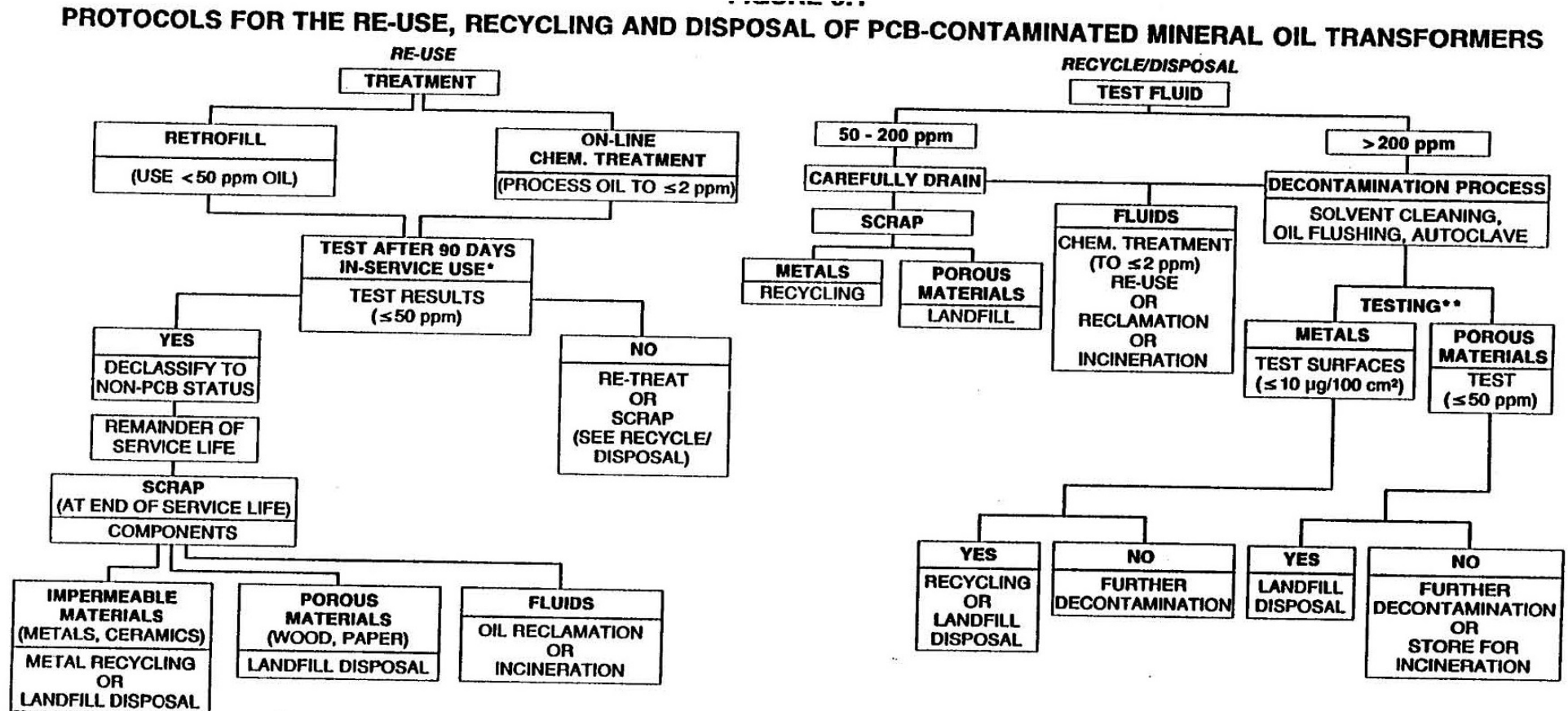


Figure 56: Protocol for the Re-Use, Recycling and Disposal of Askarel Transformers.

PROTOCOLS FOR THE RE-USE, RECYCLING AND DISPOSAL OF ASKAREL TRANSFORMERS

