



# Environmental and Social Management Plan

For

Rehabilitation/Reinforcement of 7No. Transmission Substations  
(PACKAGE 2 LOT 2): 330/132/33kV T/S at Osogbo (Osun State),  
Delta IV (Delta State), Benin (Edo State)

&

132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua  
(Edo State), and Effurun (Delta State), respectively.

Under

The Nigeria Electricity Transmission Project (NETAP).

Prepared by

Environment, Resettlement and Social Unit

Project Management Unit

Transmission Company of Nigeria

7 Hombori Street, Wuse II,

Abuja.

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## **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
dB	Decibel
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
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FCT	Federal Capital Territory
FGN	Federal Government of Nigeria
FME <sub>env</sub>	Federal Ministry of Environment
Ft	Feet
GBV	Gender-Based Violence
GRM	Grievance and redress Mechanism
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 <sub>x</sub>	Nitrogen Oxide
OHS	Occupational Health & Safety
OP/BP	Operational Policy
PCBs	Polychlorinated Biphenyls
PCR	Physical Cultural Resources
pH	Hydrogen ion concentration

## Executive Summary

### 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 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.

Whilst the projects are site-specific, they share similar equipment, layout, operational and functional characteristics, and under the same TCN management, therefore justifying a consolidated environmental and social management plan (ESMP).

However, for efficiency of implementation, the Project has been divided into three 3 Packages, with each Package containing two 2 Lots. An ESMP will be prepared for each lot to cover for all the sub-projects within the Lot.

The project will, among others:

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

This ESMP outlines measures and institutional arrangements for managing the environmental and social concerns associated with the implementation of the project for substations that have been grouped under **Package 2 - Lot 2** (i.e. Osogbo, Delta IV and Benin 330/132/33kV Transmission Substations and Ilorin, Ondo, Irua and Effurun 132/33kV Transmission Substations)<sup>1</sup>.

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<sup>1</sup> See Annexe II for Summary of the Project Packages as detailed by the Procurement Department of PMU

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## **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 maximize the environmental and socio-economic benefits of the project as well as identifying and minimizing notable adverse impacts.

The ESMP also describes measures to avoid, minimize and or mitigate identified potential environmental and social impacts. 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 should be carried out.

## **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.

## **Legal Framework**

This ESMP is guided by and designed to comply with relevant national environmental regulations, regulations of the supervisory ministry - the Federal ministry of Environment as well as the Safeguards policies of the World Bank. The specific regulatory and policy instruments that are applicable to this project are outlined below;

### **National Regulations**

#### **Regulations of the Federal Ministry of Environment (FMEnv)**

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

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

These legal instruments seek to;

1. Protect the environment from pollution;
2. Protect public health and promote social welfare;
3. Incorporate environmental resources protection in all social and economic development plans and promote sustainable development;
4. Conserve ecologically sensitive resources, protect biodiversity, and rehabilitate 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.

## **World Bank Operational Policies (OP)**

At project appraisal, the World Bank triggered the following safeguards policies to provide necessary framework for the assessment and management of environmental and social impacts that may be associated with the project - **NETAP Package 2, Lot 2;**

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**Table 1: World Bank Safeguard Policies**

<b>S/N</b>	<b>WORLD BANK SAFEGUARD POLICY</b>	<b>TRIGGERED (Yes/No)</b>	<b>JUSTIFICATION</b>
1	<b>OP 4.01</b> - 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	<b>OP 4.04</b> - Natural Habitats	No	NETAP will be implemented within existing TCN facilities and will, thus, be putting no habitat at risk.
3	<b>OP 4.09</b> - 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	<b>OP 4.10</b> - Indigenous Peoples	No	There are no indigenous peoples in the vicinity of any of the sites covered under this project.
5	<b>OP 4.11</b> - Physical Cultural Resources	No	Same as in 2 above

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6	<b>OP 4.12</b> - Involuntary Resettlement	No	<p>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. The implementation of NETAP, however, involves the re-stringing of Transmission Lines in various parts of the country. The implementation of such sub-projects will require that squatters encroaching on the Right of Way of such lines be evacuated to prevent injuries/fatalities resulting from accidents connected with electric shocks, impact of EMF or objects falling on persons.</p> <p>This implementation of NETAP may also likely result in the displacement of persons and destruction of farmlands and structures within the ROW, thus leading to loss of assets, means of livelihood or loss of shelter.</p> <p>Resettlement Action Plans (RAPs) will be prepared in line with the safeguards policy on Involuntary Resettlement to help mitigate the impacts due to these activities.</p>
7	<b>OP 4.36</b> - Forests	No	Same as in 2 above
8	<b>OP 4.37</b> - Safety of Dams	No	Same as in 2 above None of the facilities covered in the project includes a dam.
9	<b>OP 7.60</b> - Projects in Disputed Areas	No	There are no disputed lands in the project-affected areas.
10	<b>OP 7.50</b> - Projects on International Waterways	No	The project will not have any impact on the quality or quantity of water in any international waterway.

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In addition to the policies that have been triggered, the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) provides additional guidelines and is of particular interest in this project since most of the risks associated with construction activities revolve around OH&S. The guidelines 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.

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## **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 project comprises of three (3) sub-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 2, 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.



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**Table 2: Substation Locations/Project description**

<b>S/N</b>	<b>Transmission Substation/ Capacity</b>	<b>Transmission Region</b>	<b>State</b>	<b>Geo-Political Zone</b>	<b>Project Description</b>
1.	<b>Osogbo 330/132/33kV</b>	<b>Osogbo</b>	Osun	South-West	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 the control room.
2.	<b>Ilorin 132/33kV</b>	<b>Osogbo</b>	Kwara	South-West	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.	<b>Ondo 132/33kV</b>	<b>Osogbo</b>	Ondo	South-West	Supply and installation of 100MVA 132/33KV power Transformer and associated Switchgears.
4.	<b>Benin 330/132/33kV</b>	<b>Benin</b>	Edo	South-South	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.
6.	<b>Irrua 132/33kV</b>	<b>Benin</b>	Edo	South-South	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.
7.	<b>Effurun 132/33kV</b>	<b>Benin</b>	Delta	South-South	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.

## **ES 6. Project Scope, Location and Description**

The proposed projects under NETAP Package 2, Lot 2 are located in five (5) states, spread across two (2) geo-political subdivisions, namely: Osun, Ondo, and Kwara States (South-West) and Edo and Delta States (South-South) respectively.

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The states in the South-South and South-Western geo-political zones lie within the rain forest belt of Nigeria. Climatic/meteorological conditions in these locations are generally similar, experiencing heavy precipitation during the month of September with an average of 367 mm of rain. Generally, 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. Average temperatures vary 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.

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/segreated 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 of indigenes 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.

## **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 implementation of these interventions will involve excavation and backfill works, light and heavy vehicular movements, transport of construction materials as well as electrical goods and related services to various sites. Works present opportunities for employment which may induce labor influx and its associated problems including interactions between workers and 'locals' which may lead to sexual exploitation and abuse (SEA). The construction and installation activities may also generate solid and hazardous waste. It is anticipated that the following environmental and social impacts may occur through construction and operation of the substations;

- 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,

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- vi. Health and Safety,
- vii. Traffic obstruction/congestion,
- viii. Labor influx, gender-based violence, SEA and transmission of communicable diseases
- 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. Risk associated with poor management of a generated waste,
- xi. Risk of erosion, soil and groundwater contamination,
- xii. Theft of construction materials,

A detailed list of the potential associated impacts of the proposed projects under the project (NETAP Package 2 Lot 2) and the corresponding mitigation measures as well as estimated cost for remediation is provided in Table 5.1.

## **Stakeholders' Consultations**

Consultations were limited to the staff of the substation at this stage. A broader consultation for the NETAP was held at Abuja as part of the Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RF) preparation process. Additional Stakeholder consultations involving the immediate hosts and concerned communities affected by the project sites 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.

## **Resourcing and budgets**

To ensure timely and effective mitigation and monitoring an estimated total cost of **USD 940,400** is proposed for the mitigation of the potential impacts associated with the rehabilitation/reinforcement project of the 7 project sites that fall under Package 2, Lot 2.

## 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 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 would be produced for this subcomponent.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

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.

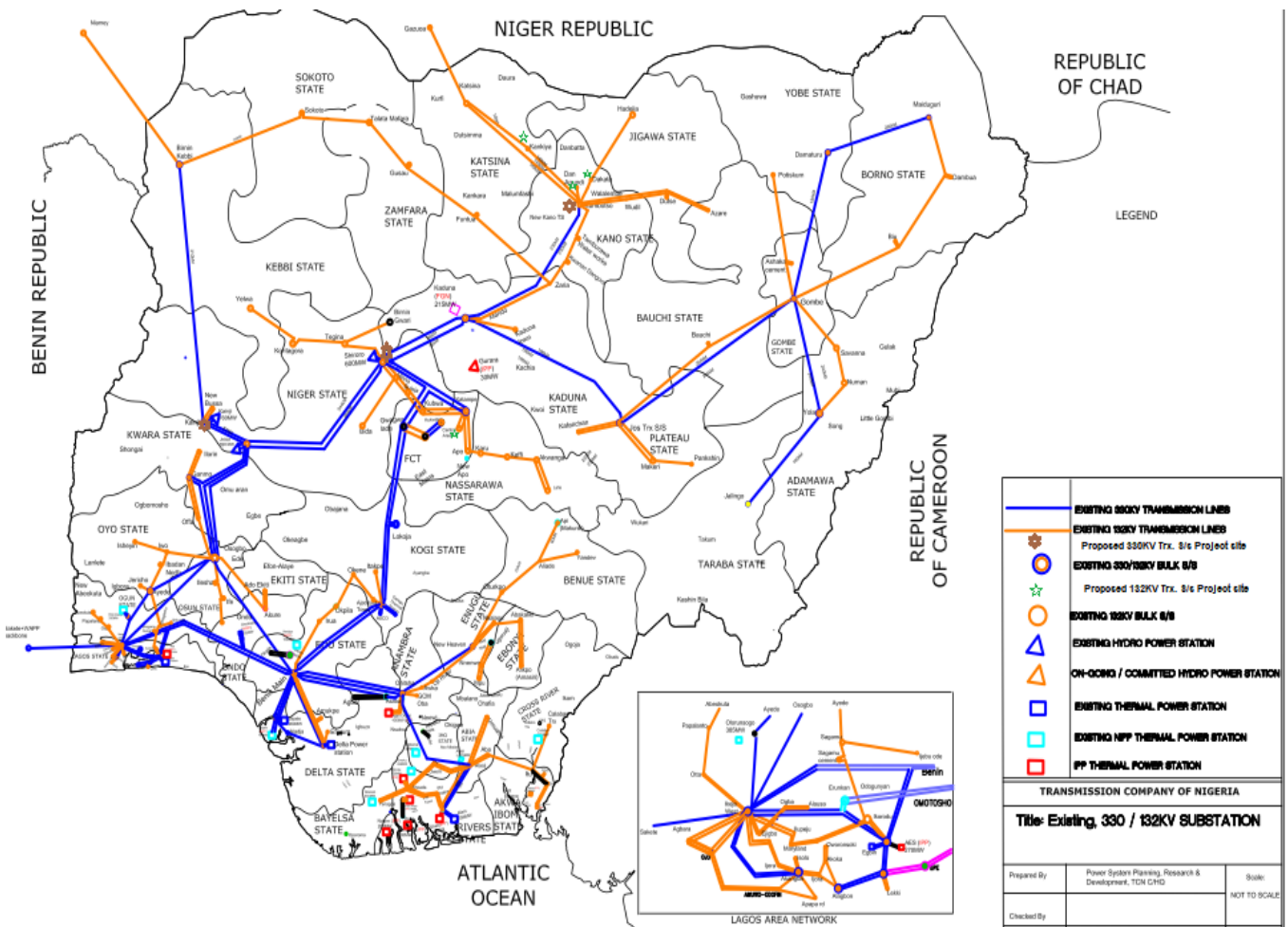
Where Bank policy (i.e. *OP 4.01*) and Nigerian guidelines on the protection of the environment differ, the policy that is more stringent will be enforced.

## **1.2 Project Locations**

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

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 Osogbo (Osun State), Delta IV (Delta) & Benin (Edo State) as well as Four (4No.) 132/33kV Transmission Sub-Stations located in Ondo (Ondo State), Ilorin (Kwara), Irrua (Edo) and Effurun (Delta State), respectively.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

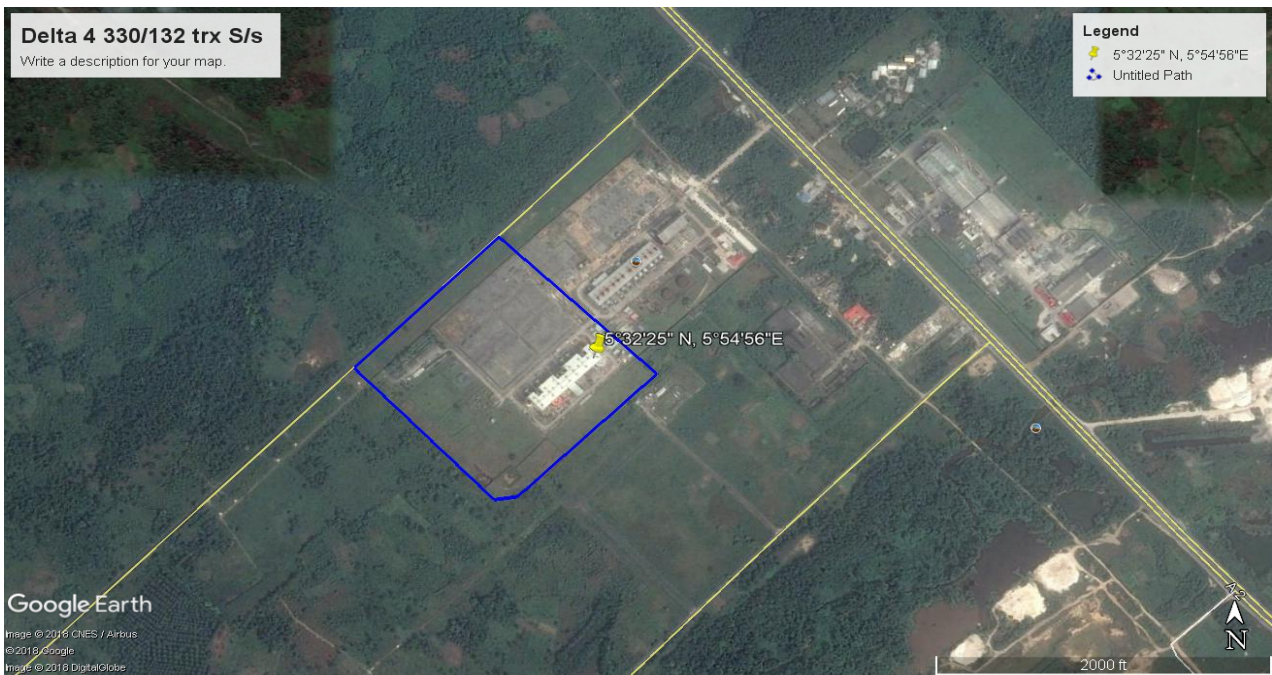


**Figure 1: TCN 330kV/132kV Transmission Lines Grid Map of Nigeria indicating the location of the proposed Substation Project sites under NETAP (Package 2-Lot 2).**





**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 4: Satellite image showing Delta IV 330/132/33kV Transmission Substation.**

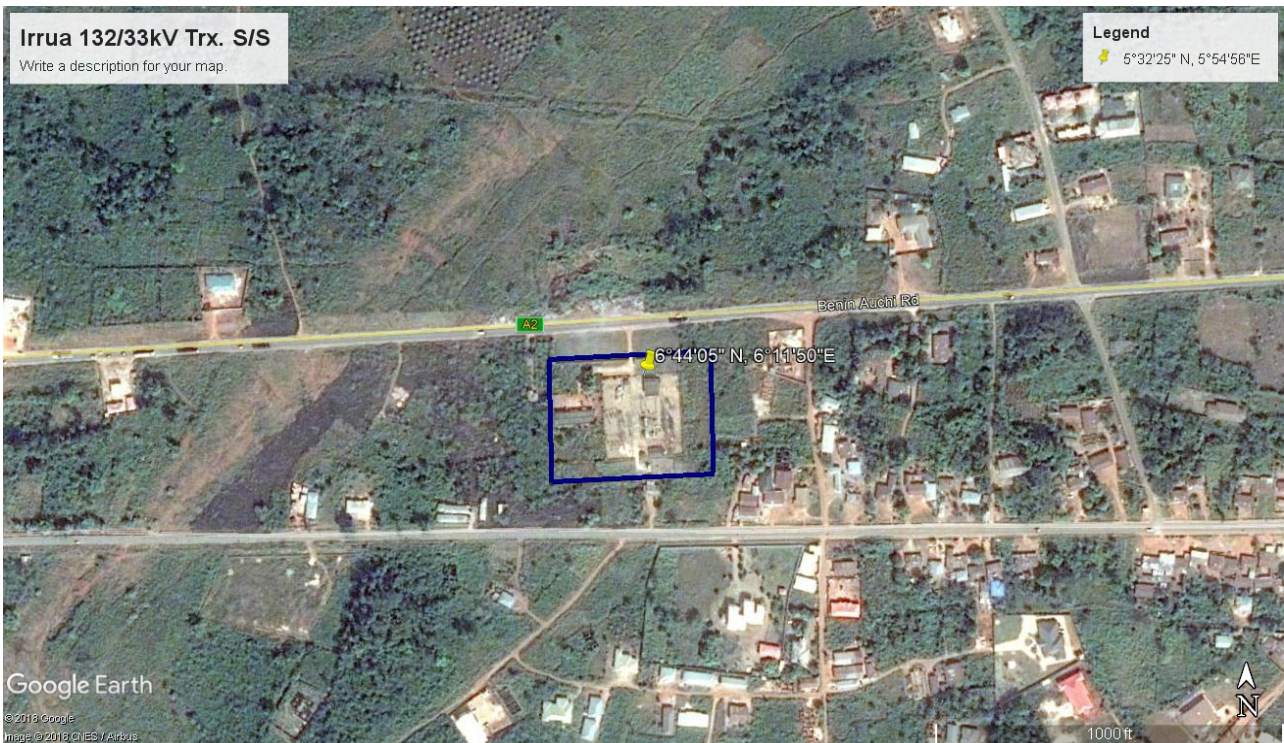


**Figure 5: Satellite image showing Ondo 132/33kV Transmission Substation.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 6: Satellite image showing Ilorin 132/33kV Transmission Substation.**



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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



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

### 1.3 ESMP Objectives

The main objective of this ESMP is to ensure that (i) the potential environmental and social impacts of the project activities are adequately addressed; and to (ii) ensure that rehabilitation activities at the selected power substation sites are conducted in compliance with the applicable environmental regulations of Nigeria and the applicable environmental and social safeguards policies of the World Bank. To mitigate the adverse impacts and enhance project benefits, the ESMP describes measures to avoid, minimize, mitigate and or compensate for adverse environmental and social impacts.

The ESMP is specifically presents:

- i. The baseline environmental and social conditions of each the selected substation sites and the surrounding areas (including audit of the existing facilities),
- ii. The potential environmental and social impacts of projects under this subcomponent during construction and operation phases,

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- iii. 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.
- iv. A guide document towards ensuring compliance with the applicable environmental regulations of Nigeria and the safeguards policies of the World Bank.

## **1.4 Approach**

The preparation of this ESMP was informed by a review of the technical data and configurations of the project elements and the project areas; baseline surveys and field visits, and the results of an Environmental and Social audits which 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:

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- 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 Osogbo, Delta IV & Benin 330/132kV Transmission Substations and Ondo, Ilorin, Irrua and Effurun 132/33kV Transmission Substation) respectively, 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.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- ***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  
i. 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 Osogbo, Delta IV, Benin, Ondo, Ilorin, Irrua and Effurun 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:

##### ➤ **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,

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- **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.

### **2.1.2 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.
4.11	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.



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

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.

**Table 4: World Bank Operational Policy Triggered**

Operational Policy Triggered	Trx. Substations affected	Justification
Environmental Assessment (OP/BP 4.01)	Osogbo, Delta IV, Benin, Ondo, Ilorin Irrua Effurun	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.

## **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. These Guidelines are based on the sustainability principles of the World Bank and are designed to achieve its development objectives. They cover four key areas:

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

The Guidelines also apply to works on power transmission projects such as the the NETAP.<sup>2</sup> The EHS Guidelines for Transmission and Distribution define the environmental issues specific to operation of Power Transmission projects as terrestrial habitat alteration, aquatic habitat alteration, electric and magnetic field, and hazardous materials. Air emissions, wastewater discharges, and solid wastes related to construction and decommissioning activities are evaluated in accordance with the EHS General Guidelines. Occupational health and safety hazards may include physical hazards such as working at heights, working with live power, and exposure to chemicals. Similarly, major community health and safety hazards may include aircraft safety, electrocution, and electromagnetic interference.

As stated in WBG General EHS guideline, when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. The following tables present WBG threshold for pertinent impacts:

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

Requirements of WB			
Noise	Receptor	One hour L <sub>Aeq</sub> (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 LAeq,8h	Maximum LAmax,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)

<sup>2</sup> See World Bank Group EHS Guideline for Electric Power Transmission And Distribution

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

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 <sub>2</sub> $\mu\text{g}/\text{m}^3$	N/A	N/A	125	N/A
	Nitrogen oxides NO <sub>x</sub> $\mu\text{g}/\text{m}^3$	200	N/A	N/A	40
	Particulates PM <sub>10</sub> $\mu\text{g}/\text{m}^3$	N/A	N/A	150	70
	Particulates PM <sub>2.5</sub> $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	N/A
	TSP $\mu\text{g}/\text{m}^3$	N/A	N/A	230	80
Ozone	N/A	160	100	N/A	

## CHAPTER THREE

### PROJECT DESCRIPTION

NETAP is part of the continuous effort of the Government of Nigeria to improve the quality of the lives of the citizens through access to power for domestic and commercial purposes. NETAP is designed to finance specific programs to increase quantity, quality and access to the electricity network; improve voltage and system reliability; and help to increase the revenue base of TCN.

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.

#### **3.1 Project Scope**

The proposed 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 Transmission Substation/Line Rehabilitation/Re-enforcement sub-projects, 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.

ESMP (Package 2 – Lot 2: 330/132/33kV T/S at **Osogbo** (Osun State), **Delta IV** (Delta State), **Benin** (Edo State) and **132/33kV T/S** at **Ilorin** (Kwara State), **Ondo** (Ondo State), **Irrua** (Edo State), and **Effurun** (Delta State), **October, 2019**.

### 3.2 Scope of Rehabilitation/ Reinforcement

Under NETAP Package 2, Lot 2, the IDA will finance the rehabilitation/re-enforcement of existing TCN substations to help achieve the overall objectives of the proposed project. Table (Table 3) below highlights details of the various interventions proposed for implementation at the respective substations.

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

S/N	Transmission Substation/ Capacity	Transmissio n Region	State	Geo- Political Zone	Project Description
1.	<b>Osogbo 330/132/33kV</b>	<b>Osogbo</b>	Osun	South-West	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.	<b>Ilorin 132/33kV</b>	<b>Osogbo</b>	Rivers	South-West	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.	<b>Ondo 132/33kV</b>	<b>Osogbo</b>	Rivers	South-West	Supply and installation of 100MVA 132/33KV power Transformer and associated

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

					Switchgears.
4.	<b>Benin 330/132/33kV</b>	<b>Benin</b>	Edo	South-South	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.
6.	<b>Irrua 132/33kV</b>	<b>Benin</b>	Edo	South-South	Reinforcement with 1 x 150MVA 330/132kV Inter-bus Transformer, 1 x 100MVA Power Transformer, High Voltage Switchgears, and Associated Equipment. Replacement of Obsolete Control and Relay Panels with Digital Control System.
7.	<b>Effurun 132/33kV</b>	<b>Benin</b>	Dekta	South-South	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.

## CHAPTER FOUR

### ENVIRONMENTAL AND SOCIAL BASELINE

This section describes the prevailing environmental and social conditions at the respective substations - Osogbo, Delta IV and Benin 330/132kV Transmission substations and Ondo, Ilorin, Irrua and Effurun 132/33kV Transmission Substations respectively - where the proposed projects under NETAP Package 2, Lot 2 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.

#### **4.1. OSOGBO 330/132/33 KV TRANSMISSION SUBSTATION**

Osogbo 330/132/33 kV Transmission Substation is a Sub-Region under the Osogbo Region which was commissioned in 1968. At the time of the safeguard assessment, the Substation had six (6) Transformers: 2x150 MVA, 1x90 MVA transformers at the 330-kV switchyard and 2x60MVA, 1x30MVA transformers for the 132kV switchyard. 4.1.1

#### **Project Location**

The Substation is located at Osogbo, the capital city of Osun State adjacent the National Control Centre along Ikirun road approximately at coordinates 7°48'02.2" N and 4°34'40.1" E.. Osun State lies within coordinates 7°30' N and 4°30' E with a population of approximately 156, 694 People (2006 Census).

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.1.2 Environmental and Social Baseline**

Osun State is located in south-west Nigeria and was carved out of the old Oyo State in August 1991 and it has Osogbo as its capital. It shares land borders in the north with Kwara State, Ekiti and Ondo States in the east, Ogun State in the south and Oyo State in the west. Osun State is home to some very important cities in Yoruba Culture and religion like Ile-Ife. Ile-Ife (the city founded by *Obatala* as commanded by the Supreme God, *Olodumare*, according to Yoruba culture). Oduduwa, a sibling of Obatala, later became ruler of Ife and his descendants reigned over several Yoruba kingdoms. Ife is popularly called ‘the city of 401 deities’. Till date Ife draws worshippers from all over the world during cultural and religious festivities. Ile-Ife is known for its ancient bronze, stone and terracotta sculptures, dating back to between 1200 and 1400 A.D. (see plates 4.1, 4.2, 4.3). The king of Ife is the Ooni, a descendant of Oduduwa. The present Ooni of Ife is Oba Adeyeye Enitan Ogunwusi Ojaja II, Ooni of Ife, (born October 17, 1974). Oba Adeyeye is a chartered Accountant and is the 51<sup>st</sup> Ooni of Ife. He succeeded the late Oba Okunade Sijuwade, who died on July 28, 2015. Other important cities are Oke-Ila Orangun, Ila Orangun, Ijebu-Jesa, Ede, Iwo, Ejigbo, Modakeke, Ibokun, Ode-Omu, Ifetedo, Esa-Oke, Ilesa and Igbajo.



[Yoruba](#) Copper mask for King Obalufon, Ife, Nigeria c. 1300 C.E.



[Bronze Head from Ife](#), probably a king and dated around 1300 C.E., in the [British Museum](#).

Being a centre of Yoruba Culture and religion has made Osun State a haven for tourism, The Osun-Oshogbo Grove is a cultural heritage site locate along the Oun River that is



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

regarded as the home of the goddess of fertility, *Yemoja*. Every year, thousands of tourists visit this site and participate in the rituals of the cultural festival.

Osogbo is the capital of Osun State with an approximate population of 156, 694 People (2006 Census).

Osun State experiences an average annual temperature between 24.5<sup>0</sup>c and 28.3<sup>0</sup>c while the average annual rainfall is between 1000mm to 1600mm. Osun State is covered by secondary forest with predominant derived savannah mosaic in the northern part. The State had a natural lowland tropical rain forest vegetation but has been influenced by human activities.

is situated in Olorunda L.G.A of the State around an area popularly known as Power-Line, along Ikirun road. The traffic in this area is mostly very congested as the Ikirun road is a major travel route outside Osogbo.

#### **4.1.3 Audit Findings at the Substation.**

The immediate environment of the substation was 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, however the premise is well drained (this is helped by the slopy nature of the land area, aside from the existence of a good drainage network within the premise).

The Substation looks rather untidy and unkempt (especially because of on-going rehabilitation works at the substation).

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 9: Weed overgrowths within the switchyard/Weed overgrowths within the switchyard.**



**Figure 10: Temporary designated Junkyard / Scrap generated from on-going construction works.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.1.3 b      *The Substation Switchyard***

The substation switchyard floor is almost completely bare of gravel, thereby encouraging growth of weeds.

The drive-way within the substation premises in a very bad condition and require rehabilitation.



**Figure 11: Drive-way within the substation in a bad state.**



**Figure 12:Blocked drainage channels/Transformer base showing signs of slight oil leakage.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

**4.1.3 c The Control Rooms**

The control rooms for the 330kV and 132kV Switchyards are situated in different buildings and the building structures are in good condition.

The two control rooms share similarities in deficiencies, some of which include; inadequate ventilation, poor illumination in some areas, worn-out furniture and sub-standard and ill-maintained toilet facilities.

Some of the cable trench slabs covers within the control rooms are either broken or out of place.



**Figure 13: Exposed cable trenches within the Control room/Debris of demolished building**



**Figure 14: Bad office furniture available for use by operators /Decaying work table in use by Operators**



**Figure 15: Restroom used by operators in poor hygienic condition / Serviced fire extinguishers**

#### **4.1.3 d Waste Management**

The wastes found at the Osogbo 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). Other wastes include waste water bags and plastic water bottles.

Waste management in the transmission substation could be significantly improved as waste 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.

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

#### **4.1.3 e Occupational Health and Safety**

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

No HSE personnel to guide visitors round the facility and ensure they adhere to safe practices at all times while at the substation.

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

#### **4.1.3 f      *Security***

The Osogbo transmission substation premises is well fenced with block walls. The illumination within the general environment of the substation, outside the switchyard, is very poor (especially at night).

#### **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.

The upgrade of the substation into a 330/132kV Transmission substation however requires the installation of a higher grade of fire-fighting equipment like stand-alone fire hydrant systems. The transmission substation operators have had little or no training in firefighting till date.

#### **4.1.4            *Proposed Intervention under NETAP***

Under the NETAP, IDA will fund the supply & installation of 1 x 300MVA 330/132kV, 1 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and associated equipment, construction of a new control room and replacement of control & relay panel with Digital Control System (DCS).

#### **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:

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- i. Construction of additional cable trench for 1 x 100MVA Transformer;
- ii. The substation vehicular drive-way should be re-tarred in order to prevent erosion, damage to vehicles and ease of movement (especially during the period when rehabilitation works is going on);
- iii. Clearing of grass and removal of scrap materials;
- iv. Delineation/Construction of a scrap/spare yard within the Substation premises;
- v. Construction of water hydrants and installation of automatic fire alarm systems at the switchyards;
- vi. Provision of adequate and standard PPEs for staff and visitors alike;
- vii. Rehabilitation of the lighting system at the switchyards (330 and 132kV);
- viii. Installation of lighting system for the entire substation surrounding;
- ix. Placement of appropriate safety warning signs at designated places within the substation premises;
- x. 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 Osogbo 330/132/33kV transmission substation;

- i. Objects falling on persons,
- ii. Electric shocks (working on a live equipment or coming in contact with exposed cables),
- iii. Slips and trips,
  - i. Power outages,
  - ii. Traffic congestions (especially due to movement of heavy duty trucks),
  - iii. Falls from heights,
- iv. Damage to existing structures,
- v. Oil spillage,
- vi. Waste generation and indiscriminate disposal of solid waste,

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- vii. Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
- viii. Theft of equipment/construction materials,
- ix. Spread of communicable infections like HIV/AIDS and other Sexually Transmitted Diseases (STDs),
- x. Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

## **4.2 DELTA IV 330/132 KV TRANSMISSION SUBSTATION**

The Delta IV 330/132kV Transmission Substation falls under the Benin Region.

### **4.2.1 Project Location**

Delta IV 330/132 kV Transmission Substation is situated in Ughelli, in Ughelli-North L.G.A of Delta State.

The substation lies within coordinates 5° 32' 29" N and 5 ° 54' 56" E, along the “Patani” Road (Warri – Port Harcourt Highway), sitting approximately 11m (36ft) above sea level.

### **4.2.2 Environmental and Social Baseline**

Delta State is located approximately between Longitude 5°00 and 6°.45' East and Latitude 5°00 and 6°.30' North in the south-south geopolitical zone of Nigeria on an estimated land area of about 16,842 square kilometers. It is bounded in the north and west by Edo State, the east by Anambra, Imo, and Rivers States, southeast by Bayelsa State, and on the southern extreme is the Bight of Benin. Delta State is generally a low-lying land with a wide coastal belt that inter-laces with rivulets and streams, which form part of the Niger River Delta.

Asaba, the State capital, is located at the northern part of the state, with an estimated area of 762 square kilometers (294 sq mi). Warri is, however, the commercial capital of the State. Delta State was carved out of the Old Bendel State on August 27, 1991.

The predominant people in Delta State are the Edoid Urhobo-Isoko; the Igbo, the Ijoid Izon and the Yoruboid Itsekiri and Olukumi .

Delta State is one of the Oil producing States in Nigeria but it is also rich in other mineral deposits which are used as raw materials for industries such as brick making, ceramics, bottle manufacturing, glass manufacturing, chemical/insulators production, chalk manufacturing and sanitary wares, decorative stone cutting



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

and quarrying. These other minerals resources include; clay, silica, lignite, kaolin, tar sand, decorative rocks, limestone, etc.

The substation is hosted by Ughelli Community within the South-South geopolitical Subdivision of Nigeria. The area is densely populated and Communities in this part of the country tend to be edgy, volatile, agitation prone and unpredictable.

### **4.2.3 Audit Findings at the Substation.**

Delta IV 330/132kV Transmission substation is generally clean and well maintained. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

#### **4.2.3 a The Substation Environment**

The Substation environment is neat and well maintained although not completely visually appealing due to the litters of waste, improperly stored equipment/materials that lie about the Substation premises.

The Substation premise is properly drained – no incidences of flooding while the access road leading to the Substation is clearly defined, tarred and free of encumbrances.

The community relations is cordial but tetchy and there were no recent incidences of agitations or disruptions.



**Figure 16: Substation Control Room is domiciled/Control panels in the existing Control within Transcorp Power building.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 17: Improperly disposed waste materials/Decommissioned equipment/materials littering the Substation premise.**

**4.2.3b      *The Substation Switchyard***

The Substation premise has almost completely free of overgrowth, while the switch-yard floor is completely free of unwanted weeds.



**Figure 18: Abandoned unused installation materials/Properly maintained Switchyard floor.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 19: Well-maintained drainage channel/Strict adherence to use of PPEs during operations. .**

**4.2.3 c      *The Control Room***

Substation Control is located within Transcorp Power building (a significant distance from Switchyard) and equipment in the Control Room are dated.



**Figure 20: Standard standby fire-fighting truck within the substation premise. /Spilled oil from an old .**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.2.3 d**      *Waste Management*

The wastes found at the Delta IV 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).

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

#### **4.2.3 e**      *Occupational Health and Safety*

Use of PPEs by workers is strictly enforced at the substation.

#### **4.2.3 f**      *Security*

The Delta IV transmission substation premises is well fenced and enjoys effective security checks and monitoring of vehicular movement within the substation premise which it shares with the Transcorp Generation Company of Nigeria.

#### **4.2.3 g**      *Fire Emergency and Precautions*

Aside from fire extinguishers available on site, there is also on stand-by a fire-fighting truck within the premises.

Though there were no smoke detectors, fire alarms and water hydrants noticeable within the substation. However, it can be concluded that the Substation is prepared to fight fire to a level where external help can be brought in to complement their efforts (especially considering the nature and combustibility of the equipment).

Also, 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 of 1 x 150MVA 330/132kV interbus Transformer, 1 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment, Construction of a new Control Room and replacement of control & relay panel with Digital Control System (DCS).

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

There is adequate space for building plinths that for the building of Transformer plinth and bays for the additional 150MVA Transformer being proposed under NETAP.

#### **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:

1. Construction of additional cable trench for 1 x 150MVA Transformer;
2. Maintenance of effective weed control practiced at the substation;
3. Removal and disposal/proper storage of scrap materials;
4. Delineation/Construction of a scrap/spares yard within the Substation premise;
5. Construction of water hydrants and installation of automatic fire alarm systems at the switchyard;
6. Rehabilitation of the lighting system at the switchyards (330 and 132kV);
7. Installation of lighting system for the entire substation surrounding;
8. Placement of appropriate safety warning signs at designated places within the substation premises;
9. 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 Delta IV 330/132kV transmission substation;

1. Objects falling on persons,
2. Electric shock (working on a live equipment or coming in contact with exposed cables),
3. Slips and trips,
4. Power outages,
5. Traffic congestions (especially due to movement of heavy duty trucks),
6. Falls from heights,
7. Damage to existing structures,

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

8. Oil spillage,
9. Waste generation and indiscriminate disposal of solid waste,
10. Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
11. Theft of equipment/ construction materials,
12. Spread of communicable infections like HIV/AIDS and other Sexually Transmitted Diseases (STDs),
13. Possible Gender-Based Violence (GBV) and Sexual Exploitation/Abuse in the surrounding community because of largely male workforce.

### **4.3 BENIN 330/132KV TRANSMISSION SUBSTATION**

#### **4.3.1 Project Location**

Benin 330/132/33 kV Transmission Substation is the city of Benin, within Ikpoba Okhai L.G.A of Edo State.

The Substation lies within coordinates 5° 38' 01" East and 6° 17' 42" North, along the “Benin – Sapele” Road, sitting approximately 88m (288ft) above sea level.

#### **4.3.2 Environmental and Social Baseline**

Edo State experiences a tropical climate. It has two distinct climatic seasons – namely, the rainy and the dry seasons.

The rainy season typically occurs between the months of April and October (with a two-week break in August). Annual average rainfall ranges between 150cm in the far north of the State to 250cm in the South.

The dry season lasts from November to April, with a cold, humid and dusty harmattan period between December and January.

Average temperatures ranges between 25°C in the rainy season and 28°C in the dry season. Generally, the climate is humid in the southern areas of the state and sub-humid in the northern parts.

The access road leading to the Substation is clearly defined, tarred and free of encumbrances, however, the road is rather very busy all year round because it is a major transport/travel route.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

The relations between the substation and the host Community is cordial and there were no incidences of agitations or disruptions.

### **4.3.3 Audit Findings at the Substation.**

Benin 330/132/33kV Transmission substation is generally clean and well 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 Substation is well kept and properly maintained. However, 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.

The Substation premise is properly drained – no incidences of flooding while the access road leading to the Substation is clearly defined, tarred and free of encumbrances.

The community relations is cordial but tetchy and there were no recent incidences of agitations or disruptions.



**Figure 21:Substation Control Room/Working area within Substation Control Room.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 22: Decommissioned equipment littering the Substation premises/Recovered transformer**

#### **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 23: Overgrown weeds have taken over part of the Switchyard floor/Part of Switchyard floor with scanty gravelling.**



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 24: Blocked drainage channel completely overtaken by overgrowths/Strict adherence to use of PPEs during application of weed control chemical fumigation.**

#### **4.3.3 c      *The Control Rooms***

The existing building structures in the substation are properly maintained and functional.



**Figure 25: Fire Extinguishers within the switchyard. / Fire Extinguishers at the Substation Control Room.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 26: Oil Spill-free transformer base/Fenced-in Shrine within the substation premise**

#### **4.3.3 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 a clearly demarcated area within the Substation premises being used for storage of scraps, construction materials or equipment and transformer oil drums but it is not managed efficiently as there can be found to be scrap materials lying in front of the demarcated area.

#### **4.3.3 e**      *Occupational Health and Safety*

Use of PPEs by workers is strictly enforced 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.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.3.3 g Fire Emergency and Precautions**

Aside from fire extinguishers available on site, there is also on stand-by a fire-fighting truck within the premises.

Though there were no smoke detectors, fire alarms and water hydrants noticeable within the substation. However, it can be concluded that the Substation is prepared to fight fire to a level where external help can be brought in to complement their efforts (especially considering the nature and combustibility of the equipment).

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

#### **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 330/132kV inter-bus Transformer, 1 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment, Construction of a new Control Room and replacement of control & relay panel 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:

1. Construction of additional cable trench for 1 x 150MVA Transformer;
2. Clearing of grass and removal of scrap materials;
3. Removal and disposal/proper storage of scrap materials;
4. Delineation/Construction of a scrap/spare yard within the Substation premise;
5. Construction of water hydrants and installation of automatic fire alarm systems in the switchyard;
6. Rehabilitation of the lighting system at the switchyards (330 and 132kV);
7. Installation of lighting system for the entire substation surrounding;
8. Placement of appropriate safety warning signs at designated places within the substation premises;

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

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

#### **4.3.6 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 Benin 330/132/33kV transmission substation;

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

#### **4.4 ILORIN 132/33 KV TRANSMISSION SUBSTATION**

Ilorin 132/33 kV Transmission Substation is under the supervision of Ganmo Work Centre, Osogbo Region and it was commissioned in 1975. The Substation had two (2) Transformers as at the time of the safeguard assessment: 1x60 MVA and 1x45 MVA transformers.

##### **4.4.1 Project Location**

The Ilorin 33/132 kV Transmission Substation is located in the busy city of Ilorin the capital of Kwara State.

The Substation lies within the approximate coordinates of 8° 28' 25" N and 4° 31' 46" E in the South-Western part of Nigeria.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.4.2 Environmental and Social Baseline**

Kwara state is located in North Central Zone of Nigeria, sitting about 306km from the coastal city of Lagos and 500km from the Federal Capital Territory, Abuja, with Ilorin as its capital. The State shares boundaries with Niger River and the Republic of Benin. The predominant ethnic group is the Yoruba's with other minorities like Nupe, Bariba and Fulani.

The larger part of northern Kwara was conquered by the Fulani in the early 19th century and remained under the Fulani Empire until the defeat of the emirs of Nupe and Ilorin by Sir George Goldie's Royal Niger Company in 1897. Kwara State was carved out of the old Northern Region in 1967. Prior to this period, Kwara was a protectorate Northern Nigeria in 1990 and a protectorate of the amalgamated colony of Nigeria in 1914.

Kwara state has numerous mineral resources such as tourmaline, tantalite, and many mineral deposits in the northern part. Cocoa and Kolanut in the Southern parts Oke - Ero, Ekiti and Isin LGA.

The mainstay of the economy in Kwara state is Agriculture. Principal cash crops such as Cotton, Cocoa, Coffee, Kolanut, Tobacco, Beniseed and Palm produce are also present in the state. All these are vital in the growth of the State's economy. The rich natural and agricultural potentials in the State supports Industries like Dangote Flour Mill, Lubcon Lubricant Company, Kam Industries Nigeria Ltd, Tuyil Pharmacy Nig Ltd, Padson Industries NiG Ltd, Kwara Breweries, Ijagbo Global Soap and Detergent Industry, United Match Company, Tate and Lyle Company, Resinoplast Plastic Industry, Latbash interiors, LandB group, Phamatech Nigeria Limited, Kwara Textile and Kwara Furniture Company all in Ilorin. Others are Paper Manufacturing Industry, Jebba, Okin Foam and Okin Biscuits, Offa, Kay Plastic, Ganmo and Kwara Paper Converters Limited, Erin-ile. Others are Sugar Producing Company, Bacita, Kwara animal Feed Mall, Ilorin and the Agricultural Products Company.

Ilorin experiences a tropical climate under the influence of the two trade winds prevailing over the country (Nigeria).

Ilorin metropolis experiences two climatic seasons i.e. rainy and dry season. The rainy season is between March and November and the annual rainfall varies from 1000mm to 1500mm, with the peak between September and early October. Also, the monthly temperature is generally high throughout the year. The daily average temperatures are in January with 25° C, May 27.5° C and September 22.5° C.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

The vegetation type found here is derived savannah with riparian forests along the river bank.

Include Social Baseline??

#### **4.4.3 Audit Findings at the Substation.**

House-keeping in Ilorin 132/33kV Transmission substation is very poor and the substation looks very unkempt, with litter and scrap materials inappropriately dumped within the Station. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

##### **4.4.3 a      *The Substation Environment***

Ilorin substation shares its premise with the Ibadan Electricity Distribution Company (IBEDC) which is in charge of electricity distribution in Kwara State.

The concrete structure of the control room which also serves as office space for the Operators is in very poor state - Ventilation is poor, lightening is poor, furniture are old and damaged, while the toilet facilities are in a very deplorable state of hygiene.

Weeds overgrowths can be seen all around the premises.

The substation usually experiences flooding during the rainy season, however, there is on-going rehabilitation by TCN at the substation and the drainage channels are being expanded to help tackle this challenge.

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

The area where the Substation is situate is densely populated in a rather very busy area, however, the relationship with the host community is cordial and there had been no case of violence or dispute between the host community and the Station Staff/management.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 27: Weed overgrowths within the switchyard/On-going civil works (construction of a new security post).**

#### **4.4.3 b      *The Substation Switchyard***

The substation switchyard floor is almost completely covered with weed overgrowths and is poorly maintained.



**Figure 28: Antiquated generator in use at the Substation (source of noise and air pollution)/Transformer base showing signs of oil leakages.**

#### **4.4.3 c      *The Control Room***

The control room for the 132kV Switchyard is in a very bad shape (broken windows, damaged and old furniture, unhygienic toilet facilities, decaying building structure, poor ventilation, etc are prominent features) and is in dire need of urgent rehabilitation.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

Some of the cable covers trench slabs within the control rooms are either broken or out of place.



**Figure 29: Broken louvre panes and bad office furniture within the control room.**



**Figure 30: Deplorable state of toilet facilities/ Serviced fire extinguishers ready for deployment in the event of fire outbreak.**



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.4.3 d      *Waste Management***

The waste found at the Ilorin 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). Other wastes include waste water bags and plastic water bottles.

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.

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***

A major Occupational Health and Safety concern at Ilorin substation is the non-adherence to/enforcement of the use of PPEs by workers.

There is no HSE Staff stationed at the substation, though the Safety Officer at Ganmo Work Centre supervises HSE matters concerning Ilorin substation, occasionally.

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

#### **4.4.3 f      *Security***

The Substation is relatively secured by security personnel manning the gates and overseeing the premises all through the day and night, however, the substation is poorly fenced which leaves it susceptible to unsolicited invasions/encroachment.

#### **4.4.3 f      *Fire Emergency and Precautions***

The Substation has fire extinguishers that are regularly serviced by Ganmo Work center. Though the fire extinguishers are insufficient to efficiently fight fire outbreak, considering the type of equipment at the substation. Hence, there is need to provide the substation with smoke detectors, fire alarms and fire hydrant machines.

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.4.4 Proposed Intervention under NETAP**

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation of 2 x 100MVA 132/33kV Power Transformers, High Voltage Switchgears and Associated Equipment, Construction of a new Control Room and replacement of control & relay panel with Digital Control System (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:

1. Rehabilitation of the control room building;
2. Re-graveling of the switchyard floor;
3. Clearing of grass and removal of scrap materials;
4. Refencing of the substation perimeter;
5. Replacement of old and weak furniture;
6. Upgrade of toilet facilities;
7. Delineation/Construction of a scrap/spare yard within the Substation premise;
8. Construction of water hydrants and installation of automatic fire alarm systems at the switchyard;
9. Rehabilitation of the lighting system at the switchyard;
10. Provision of adequate and standard PPEs for staff and visitors alike;
11. Installation of lighting system for the entire substation surrounding;
12. Placement of appropriate safety warning signs at designated places within the substation premises;
13. Provision of first Aid equipment/materials and training in administration of First Aid.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **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 Ilorin 132/33kV transmission substation;

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

#### **4.5 ONDO 132/33 KV TRANSMISSION SUBSTATION**

The Ondo 132/33 kV Transmission Substation is supplied by the Omotosho Sub-Region, under Osogbo Region. The substation was commissioned in 1984 and presently has two (2No.) Transformers (2x30 MVA), servicing Ondo town and its immediate environs.

##### **4.5.1 Project Location**

The Ilorin 33/132 kV Transmission Substation is situated off the Ondo – Ore road in Ondo town, Ondo state.

The Substation lies within the approximate coordinates of 7° 03' 22" N and 4° 50' 25" E in the South-Western part of Nigeria.

##### **4.5.2 Environmental and Social Baseline**

Ondo state is located in the south-western zone of Nigeria with its State capital at Akure. The state was created on 3 February, 1976 out of the then Western State. Ondo State is made

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

up of 19 Local Government Areas (LGAs). It borders Ekiti State to the North, Edo State to the east, Delta State is to the Southeast, Kogi State is to the Northeast, Ogun and Osun State to the Southeast and Northwest respectively. Osun and Ogun State are the closest state to Ondo in the western region.

Ondo State is believed to have been created by the daughter of Alaaḡin of OYO, who was referred to as the first Osemawe (a title given to the rulers) of Ondo state. The state is also reputed to be one of the places with the highest chances of a woman giving birth to twins since the state itself was created by twin sisters,

Yoruba is the predominant ethnic group in Ondo state but other different dialects other than Yoruba are spoken in the state, they include: Akoko, Apoi, Idanre, Ijaw, Ikale, Ilaje, Ondo and the Owo. The Ijaw People live in the coastal areas.

Ondo State is situated in the tropical belt, covering a land mass of about 14,788.723 Square Kilometres. The 2006 census puts the population of Ondo State at 3,460,877 people.

Agriculture is the main source of the state's economy with the State being rich in cash crops like Cotton, Tobacco, Rubber, Timber and Cocoa. The state is Nigeria's biggest cocoa producing state. Minerals resources found in the State include; Kaolin, Pyrites, Iron Ore, Petroleum and Coal can be found in Ondo State.

Key industries in the State include the textile mill at Ado Ekiti and the palm oil processing plant at Okitipupa.. The state economy also grows due to the wildlife and tourist attractions such as the Ikogosi hot spring and the Idanre Hills.

Ondo State is situated in the Southwestern belt of the Nigerian rainforest, hence it is characterized by annual rainfall which varies from 2000mm to 1150mm in the southern and northern areas of the State respectively. The State experiences high humidity while the temperature ranges between 21° C and 29° C.

The substation is situated in the city of Ondo, Ondo West LGA of Ondo State.

#### **4.5.3 Audit Findings at the Substation.**

Housekeeping in practice at Ondo 132/33kV Transmission substation is commendable - The substation premise was quite clean and well kept.

This section describes the general environment of the substation and proffers measures for addressing lapses observed.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.5.3 a                    *The Substation Environment***

The drainage system of the Station is rather poor as the switchyard and sometimes the Control room get flooded during the rainy season due to blocked drainage trenches. The blocked drainage outside the Substation and the sloppy topography of the land also contributes to the flooding of the Substation.

There were no overgrowths in the switchyard and within the substation premise, however, the immediate surroundings were very bushy (basically as a result of inadequate funding for weed control).

The Access road leading to the Substation is clearly defined and free of encumbrances but untarred.



**Figure 31: Approach to the substation entrance/Rusty and weak looking entrance gate Securing the substation.**

#### **4.5.3 b                    *The Substation Switchyard***

The substation switchyard floor is kept weed free through regular and effective control measures applied by the substation management.

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 32: Transformer base showing signs of oil leakage.**

#### **4.5.3c                      *The Control Room***

The building structure of the control room which also serve as office space for the Operators is in very poor condition due to age and inadequate maintenance; poor ventilation, poor illumination, damaged furniture and poor state of toilet facility.



**Figure 33: Sparse First Aid kits in the First Aid available for use by operators.**

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**



**Figure 34: Restroom used by operators in a state of poor hygiene/ Serviced fire extinguishers ready for deployment in the event of fire outbreak.**

#### **4.5.3 d Waste Management**

There is no rehabilitation works going on at the substation presently, therefore wastes generated is at its barest minimum and this is managed effectively as is evidenced by the prevailing neatness of the substation.

However, scraps (unused or defective equipment, broken insulator fragments, etc) can still be seen lying about the substation premises, basically because there is no area within the premises dedicated as a “Junkyard”.

Also, waste management in the transmission substation could be significantly improved through sorting/segregation of wastes into the different waste streams for more effective disposals.

#### **4.5.3 e Occupational Health and Safety**

A major Occupational Health and Safety concern at Ondo substation is the non-availability of PPEs for use by workers and visitors alike.

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

#### **4.5.3f Security**

The Station does not have concrete fencing and is only barricaded by barbed wire while strict restriction to the switchyard is not enforced as there is no perimeter fencing also.

#### **4.5.3h Fire Emergency and Precautions**

The Substation has fire extinguishers that are regularly serviced, though the fire extinguishers are insufficient to efficiently fight fire outbreak, considering the type of equipment at the substation. Hence, there is need to provide the substation with smoke detectors, fire alarms and water hydrants.

It is also pertinent 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 of 2 x 30MVA 330/132kV, 2 x 60MVA 132/33kV Power Transformers, Replacement of High Voltage Switchgears and Associated Equipment, Construction of a new Control Room and replacement of control & relay panel with Digital Control System (DCS).

Conversion of 6nos. 33kV Indoor to 8No Outdoor substations and Rehabilitation of control room.

### **4.5.5 Additional Interventions Recommended for Implementation**

In addition to the interventions proposed in 4.5.4 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:

1. Re-graveling of the switchyard floor;
2. Clearing of grass and removal of scrap materials;
3. Refencing of the substation perimeter;
4. Replacement of old and weak furniture;
5. Upgrade of toilet facilities;
6. Delineation/Construction of a scrap/spare yard within the Substation premises;



**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

7. Construction of water hydrants and installation of automatic fire alarm systems within the switchyard;
8. Rehabilitation of the lighting system at the switchyard;
9. Rehabilitation of the drainage system;
10. Provision of adequate and standard PPEs for staff and visitors alike;
11. Installation of lighting system for the entire substation surrounding;
12. Placement of appropriate safety warning signs at designated places within the substation premises;
13. Provision of first Aid equipment/materials and training in administration of First Aid.

#### **4.5.6 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 Ondo 132/33kV transmission substation;

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

## **4.6 IRRUA 132/33KV TRANSMISSION SUBSTATION**

### **4.6.1 Project Location**

Irrua 132/33 kV Transmission substation is situated in Irrua, within Irrua Central L.G.A of Edo State.

The Substation lies within coordinates 6° 11' 50" East and 6° 44' 05" North, along the “Benin – Auchì” Expressway, sitting approximately 401m (1316ft) above sea level.

### **4.6.2 Environmental and Social Baseline**

Edo State experiences a tropical climate. It has two distinct climatic seasons – namely, the rainy and the dry seasons.

The substation is hosted by Irrua community (Irrua being the administrative headquarters of Esan Central L.G.A. in Edo State), located within the South-South geopolitical Subdivision of Nigeria).

The access road leading to the Substation is clearly defined and tarred, though some stretches along the road (“Benin – Auchì” Expressway) are very bad and may be impassable - especially during the rainy season.

The Community is densely populated and generally very peaceful but possess the potential of being combustible when agitated.

### **4.6.3 Audit Findings at the Substation.**

Irrua 132/33kV Transmission substation is generally clean and well maintained. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

#### **4.6.3 a *The Substation Environment***

The Substation is poorly maintained and looks rather unkempt. 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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

lying about, hazardously) within the Substation premises thereby creating an unhealthy environment which is also unpleasing to the eye.

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

The Substation premise is properly drained and does not experience incidences of flooding, while the access road leading to the Substation is clearly defined, tarred and free of encumbrances.

#### **4.6.3 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.

Some of the Cable trench cover slabs are broken (or missing completely) thereby leaving current-carrying cables hazardously exposed and susceptible to damage or harm to people.



**Figure 35: Scraps littering the Substation premise/ scantily graveled switchyard floor (with patches of light overgrowths).**



**Figure 36: Missing cable trench slabs.**

#### **4.6.3 c                    *The Control Room***

The existing building housing the Control Room is old and poorly maintained. The confine within which the operators perform their routine duties, is rather choked.

Furniture used by the operators are old and weak and there need for them to be replaced.

#### **4.6.3 d                    *Waste Management***

There is no rehabilitation works going on at the substation presently, therefore wastes generated is at its barest minimum.

However, scraps (unused or defective equipment, broken insulator fragments, etc) can still be seen lying about the substation premises, basically because there is no area within the premises dedicated as a “Junkyard”

Waste management in the substation could be significantly improved through the sorting/segregation of wastes into the different waste streams for more effective disposals.

Waste collection points are major attraction for insects and rodents which in turn attracted reptiles especially snakes.

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

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

A major Occupational Health and Safety concern at Irrua substation is the non-availability of PPEs for use by workers and visitors alike.

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

#### **4.6.3 f      *Security***

Though there is the presence of one security personnel, the security arrangement is grossly inadequate and could be easily breached, considering its secluded location within the community.

Also, Lighting in the Substation premises (including the Switchyard) is very poor, a situation which is worrying (especially at night) – operationally and security wise.

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

Although fire extinguishing cylinders were available on site (some un-serviced) but there were no smoke detectors, fire alarms, water hoses or 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.

### **4.6.4 Proposed Intervention under NETAP**

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the Supply & Installation of 1 x 100MVA 132/33kV Power Transformer and associated Switchgears.

### **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:

1. Re-graveling of the switchyard floor;

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

2. Clearing of grass and removal of scrap materials;
3. Re-fencing of the substation perimeter (in the control room and security post);
4. Replacement of old and weak furniture;
5. Upgrade of toilet facilities;
6. Delineation/Construction of a scrap/spares yard within the Substation premises;
7. Construction of water hydrants and installation of automatic fire alarm systems in the switchyard;
8. Rehabilitation of the lighting system at the switchyard/Substation;
9. Provision of adequate and standard PPEs for staff and visitors alike;
10. Installation of lighting system for the entire substation surrounding;
11. Placement of appropriate safety warning signs at designated places within the substation premises;
12. Provision of first Aid equipment/materials and training in administration of First Aid.

#### **4.6.6 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 Irrua 132/33kV transmission substation;

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

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

## **4.7 EFFURUN 132/33KV TRANSMISSION SUBSTATION**

### **4.7.1 Project Location**

Effurun 132/33 kV Transmission substation is situated in Effurun, within Uview L.G.A of Delta State.

The Substation lies within coordinates 5° 47' 30" East and 5° 33' 35" North, sitting approximately 10m (32.8ft) above sea level.

### **4.7.2 Environmental and Social Baseline**

Delta State is situated in the tropics and therefore experiences a fluctuating climate, ranging from the humid tropical in the south, to the sub-humid in the northeast. The decreasing humidity towards the north is accompanied is increasingly marked by dry season.

The average annual rainfall is about 266.5 mm in the coastal areas and 1905mm in the extreme north. Rainfall is heaviest in July. Temperatures increase from south to north. In Warri, located in the south for example, the average daily temperature is 30°C, while the temperature in Asaba in the north eastern area is 44°C.

The substation is hosted by Effurun Community within the South-South geopolitical Subdivision of Nigeria.

The area is densely populated and generally and Community is generally peaceful but tend to be edgy, and confrontational when agitated.

### **4.7.3 Audit Findings at the Substation.**

Irrua 132/33kV Transmission substation is generally clean and well maintained. This section describes the general environment of the substation and proffers measures for addressing lapses observed.

#### **4.7.3 a *The Substation Environment***

Sake for the physical structures the Substation is that are quite old and poorly maintained, the substation premise is generally kept clean, though litters of decommissioned equipment, scraps, condemned parts and casings abound (dangerous rusted nails exposed, broken pieces

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of wood, shards of porcelain from broken insulators and dangerous metals lying about, hazardously) can be seen lying about the premise thereby creating an unsafe 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.

The Substation premise is properly drained and does not experience incidences of flooding. However, broken cable trench-cover slabs cause blockages to drainage channels (which also serve as cable trenches) which could be problems in future.

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



**Figure 37: Decrepit building structure/ Very poor furnishing in the Substation Security post.**

#### **4.1.3 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.

Some of the Cable trench cover slabs are broken (or missing completely) thereby leaving current-carrying cables hazardously exposed and susceptible to damage.



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**Figure 38: Transformer Oil drums, decommissioned equipment/materials littering the Substation premises**



**Figure 39: Overgrown weeds have taken over significant part of the Substation premise.**

**4.7.3 c                      *The Control Room***

The existing building housing the Control Room is old and poorly maintained. The confine within which the operators perform their routine duties is choked.

Furniture used by the operators are old and weak and there need for them to be replaced.

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**Figure 40: Broken/Collapsed trench slabs and Spilled oil from very old transformer within switchyard.**



**Figure 41: Fire Extinguishers at the Control Room.**

#### **4.7.3d Waste Management**

There is no rehabilitation works going on at the substation presently, therefore wastes generated is at its barest minimum.

However, scraps (unused or defective equipment, broken insulator fragments, etc) can still be seen lying about the substation premises, basically because there is no area within the premises dedicated as a “Junkyard”

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Waste management in the substation could be significantly improved through the sorting/segregation of wastes into the different waste streams for more effective disposals.

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

#### **4.7.3 e      *Occupational Health and Safety***

A major Occupational Health and Safety concern at Effurun substation is the non-availability of PPEs for use by workers and visitors alike.

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

#### **4.7.3 f      *Security***

Though there is the presence of one security personnel, the security arrangement is grossly inadequate and could be easily breached, considering its secluded location within the community.

Also, Lighting in the Substation premises (including the Switchyard) is very poor, a situation which is worrying (especially at night) – operationally and security wise.

It is also pertinent to point out that the security post is not fit for human inhabitation, unfortunately that is the situation and this which will definitely impact on the output of the security personnel on duty.

#### **4.7.3 h      *Fire Emergency and Precautions***

Fire extinguishing cylinders were available on site (some un-serviced) but there were no smoke detectors, fire alarms, water hoses or 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.

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#### **4.7.4 Proposed Intervention under NETAP**

Under the proposed Nigeria Electricity Transmission Project, the IDA will fund the replacement of 1 x 60MVA 132/33kV with a new 1 x 60MVA 132/33kV Power Transformer, High voltage Switchgears and associated equipment and the construction of 4 No. additional feeder bays.

#### **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:

1. Re-graveling of the switchyard floor;
2. Clearing of grass and removal of scrap materials;
3. Refencing of the substation perimeter;
4. Refurbishment of old Building structures; Replacement of old and weak furniture;
5. Upgrade of toilet facilities;
6. Delineation/Construction of a scrap/spares yard within the Substation premises;
7. Construction of water hydrants and installation of fire automatic fire alarm systems at the switchyards;
8. Rehabilitation of the lighting system at the switchyard/Substation;
9. Provision of adequate and standard PPEs for staff and visitors alike;
10. Installation of lighting system for the entire substation surrounding;
11. Placement of appropriate safety warning signs at designated places within the substation premises;
12. Provision of first Aid equipment/materials and training in administration of First Aid.

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#### **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 Effurun 132/33kV transmission substation;

1. Objects falling on persons,
2. Electric shock (working on a live equipment or coming in contact with exposed cables),
3. Slips and trips,
4. Power outages,
5. Traffic congestions (especially due to movement of heavy duty trucks),
6. Falls from heights,
7. Damage to existing structures,
8. Oil spillage,
9. Indiscriminate disposal of solid waste,
10. Disrespect to socio-cultural beliefs/practices of locals by foreign contractor workers,
11. Theft of equipment/construction materials,
12. 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 2 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 2 could be grouped under the following headings; Wastes, Occupational Health & Safety and Socio-economic impacts.

##### **5.1.1 Wastes**

Wastes, under this project, include all by-products of materials or results of construction activities that may constitute a negative introduction into the immediate environment if not properly handled in a timely manner. They could be hazardous or non-hazardous, persistent or bio-degradable and include the following;

##### **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:

- i. Samples of discharge water be taken and analyzed to accurately determine the oil load in the water and other contaminants that are above the standards required by law,
- ii. Analysis for PCBs should also be undertaken for the wastewater in the oil drain pit,
- iii. Installation/rehabilitation of the existing the compact gravity oil separator unit,
- iv. 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 workers 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:

- Wetting all waste items and underneath soil before any handling,
- Careful placement of wet asbestos waste in suitable container bags,
- 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,
- Parts of the soil should also be placed in containers bag in wet condition for cleaning the area.
- 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.



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- Asbestos waste should be handled and transported by qualified hazardous waste contractors.
- 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;

- The area of maintenance should be isolated and provided with portable ventilation equipment,
- By all means, sawing, sanding and drilling asbestos is prohibited,
- In case accidental disturbance occurred to an asbestos surface the area should be evacuated,
- 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,
- All above measures should be supervised by HSE staff that has received professional asbestos training,
- 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 measure are recommended to reduce the significance of the impacts of solid wastes:

- i. Use of only officially designated disposal sites by the Contractor for all construction wastes,
- ii. Use of appropriate disposal trucks for the evacuation and disposal of construction wastes,
- iii. 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,
- iv. The Evacuation and disposal of wastes from the substation must be properly supervised,

- v. 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,
- i. Cover friable materials during storage,
- ii. 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 role.

- 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**

- i. 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.

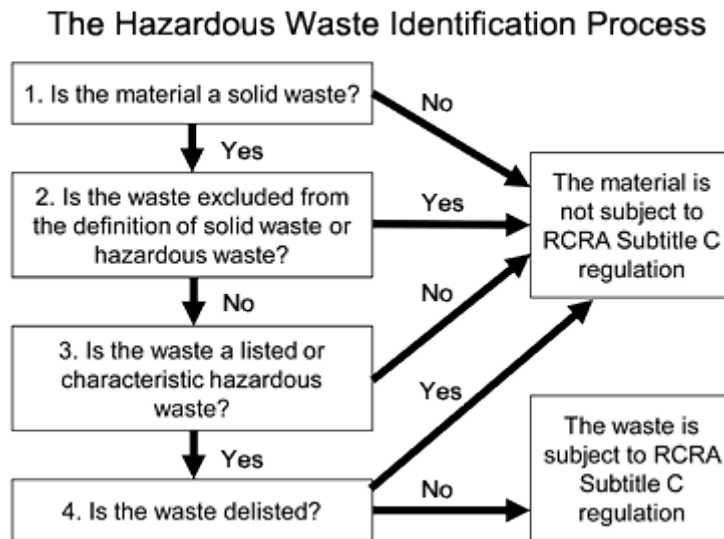
**5.1.1c Hazardous Wastes**

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 falls 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;
  - v. Storage containers must be in good condition,
  - vi. The waste placed in the container must be compatible with the container,
  - vii. 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,
  - viii. Containers must be placed next to or near the process that generates the waste,
  - ix. Containers **MUST** be kept closed at all times except when adding or removing waste. Do not leave a funnel in the hazardous waste container,
  - x. Containers must be segregated by hazard class (e.g. acids from bases and flammables),
  - xi. All satellite accumulation areas must be under the control of the operator of the process generating waste,
  - xii. Containers and area must be inspected at least weekly for leakage,
  - xiii. 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.
- i. Clear and correct labels are placed on the different storage containers,
- ii. The containers are inspected monthly for leaks or any other form of damage and are kept in good condition,
- iii. No mixing of different hazardous waste streams is taking place,
- iv. The area is properly shaded from rain and sun heat/light,

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- v. Must have a water supply,
- vi. Must be accessed from at least two sides for emergency,
- vii. 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 and injury 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 (first aid kits, qualified nurse, qualified HSE Expert) 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

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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 –
- xii. the Contractor MUST not, under no circumstance, use personnel that are adequately trained or faulty/unsuitable equipment for any task.
- xiii. **Conduct daily safety toolbox meetings plus job hazard assessment**

### **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 (during the tool-box talk every morning) 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,

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- 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 Social Impacts**

#### **Impacts due to Movement of Vehicles and Equipment**

Construction activities will involve the movement of workers, construction materials and equipment to and from the project site. This could cause or exacerbate traffic congestion with its attendant social problems 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 all the time.
- 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.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

### 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 and 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.

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

### 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 shows that the situation has the potential to result in instances of gender-based violence and sexual exploitation and abuse of women and young girls. This ESMPs includes 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;

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

- 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). The Code of Conduct should include statement against amorous relationship between workers and local women/girls 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; and include avenues for GBV survivors to lodge complaints against workers. The process of GBV complaints must be guarantee confidentiality and be handled by GBV professional.
- v. Ensure that implementation of the CESMP, including labor management plan are enforceable provisions of the construction contract.

The table (Table 6) below shows the identified potential impacts associated with the proposed rehabilitation/re-enforcement projects at Osogbo, Benin, Delta IV, Ilorin, Ondo, Irrua and Effurun Transmission Substations, the proposed mitigation measures and other safeguard interventions that will complement the proposed projects at the respective substations;



ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.

**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	Construction of storm-water drains from the point of discharge;  Clearing of all existing drainage channels within the project site;	3,000.0  1,000.0
		Effluents	Release of waste fluids from transformer oil filtration process, paints, grease etc. (Installation).	8 months	Major	Effluents should be collected into impervious collectors at the point of discharge;	1,000.0
		Excavations	Beginning of project (civil works).	6 months	Minor	Clean-up and restoration of excavation sites IMMEDIATELY the equipment foundations are erected.	<b>1,000.0</b>
		Building Materials	Beginning of project and during all civil works	6 months	Major		

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		Other non-hazardous wastes	During installation	8 months	Medium	<ul style="list-style-type: none"> <li>• Provision of waste collection bins at appropriate places within the project site.</li> <li>• Segregation of wastes based on the agreed colour codes.</li> <li>• Prompt collection and disposal of wastes at designated dump sites by appropriate waste collectors.</li> </ul>	3,000.0 1,000.0 1,000.0
		Hazardous Wastes (PCBs) and other hazardous substances.	Decommissioning of equipment (Transformers/s witchgears, CTs) to be replaced.	1 month	Major	<ul style="list-style-type: none"> <li>• If PCB contamination is detected on testing of Transformer Oils, Oil contaminated soils/water sources refer to PCB Protocol in Annex 3.</li> <li>• 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.</li> <li>• 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 pesticide container rinse water by spreading it on fields or lawns at the proper application rate.</li> <li>• Contain any unusable wastes, spills and drips for appropriate disposal.</li> </ul>	
			During installation	8 months			

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>• 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.</li> <li>• Segregate different types of waste in storage to prevent dangerous chemical reactions that could release the products.</li> <li>• Have emergency equipment, such as adsorbents and shovels, ready to contain spills.</li> </ul>	<p>5,000.0</p> <p>1,000.0</p> <p>1,000.0</p>
2.	Emissions	Air Emissions	<ul style="list-style-type: none"> <li>• During site clearing</li> <li>• Movement of vehicles on un-tared access roads</li> <li>• From exhaust fumes of project vehicles</li> </ul>	<p>1 month</p> <p>8 months</p> <p>8 months</p>	Minor	<ul style="list-style-type: none"> <li>• Surface access roads and on-site roads with aggregate materials, wherever appropriate.</li> <li>• Minimize the amount of disturbance and areas cleared of vegetation.</li> <li>• Reduce project-related greenhouse gas emissions in a manner appropriate to the nature and scale of project operations and impacts.</li> <li>• Enact fugitive dust and vehicle emission controls.</li> <li>• Use dust abatement techniques on unpaved, un-vegetated surfaces to</li> </ul>	3,000.0

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<p>minimize airborne dust during earthmoving activities, prior to clearing, excavating, backfilling, compacting, or grading, and during blasting.</p> <ul style="list-style-type: none"> <li>• Establish and enforce speed limits to reduce airborne fugitive dust.</li> <li>• When feasible, shut down idling construction equipment.</li> <li>• Revegetate disturbed areas as soon as possible after disturbance.</li> </ul>	500.0
		Noise Emissions			Minor	<ul style="list-style-type: none"> <li>• Substitute a less noisy process. For example, use a hydraulic block splitter rather than a cut-off saw to cut blocks.</li> <li>• 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.</li> <li>• 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</li> </ul>	

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						types of tool. For example, choose plastic or rubber hammers, rather than	
						<ul style="list-style-type: none"> <li>• metal, to free collars on falsework legs.</li> <li>• Use of appropriate PPEs (Ear muffs).</li> </ul>	
3	Health and Safety	Fall from Height	During installation	8 months	Major	<ul style="list-style-type: none"> <li>• Identify all Fall Hazards on site</li> <li>• Communicate the potential fall hazards to all workers/visitors on site through tool-box talks and training</li> <li>• Provide appropriate PPEs for all personnel exposed to any particular fall height associated with their tasks Enforce compliance with fall hazard</li> <li>• Prevention protocol established for the project through appropriate supervision and use of PPEs.</li> </ul>	
		Objects falling on persons	During installation	8 months	Major	<ul style="list-style-type: none"> <li>• Ensure continual training of staff on relevant safety procedures</li> <li>• Avoid working under unstable, suspended equipment/materials</li> <li>• Use of Appropriate PPE (Hard Hat).</li> <li>• Effective supervision of workers if work must be done under such conditions.</li> </ul>	

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

		Slips and Trips	Mostly during civil works (excavation of foundation pits).	3 months	Major	<ul style="list-style-type: none"> <li>• Design of workplace &amp; work processes that eliminate or reduce exposure to Slips &amp; Trips (including appropriate signages)</li> <li>• <i>(Design workplace &amp; processes to prevent potential exposures to slip &amp; trip hazards)</i></li> <li>• Good housekeeping <i>(Maintain clear, tidy work areas free of clutter).</i></li> <li>• Safe walking practices</li> <li>• <i>(Follow safe walking practices &amp; routes).</i></li> <li>• Wearing proper footwear</li> <li>• <i>(Wear proper footwear with good traction).</i></li> <li>• Contain work processes to prevent discharge, splatter, or spillage of liquids, oils, particles, dusts &amp; offal onto floor <i>(Local exhaust ventilation, Extraction/ collection systems, Enclosures, Work surfaces with raised or lipped edges, , Catch/ drip pans, drain-offs).</i></li> <li>• Use drip trays to contain leaks of lubricant onto floor from machinery</li> </ul>	<p>1,000.0</p> <p>1,000.0</p> <p>1,000.0</p> <p>1,000.0</p> <p>3,000.0</p>
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**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>• Perform regularly scheduled maintenance</li> </ul>	1,000.0
						<ul style="list-style-type: none"> <li>• Use adequate ventilation to avoid smoke, steam &amp; condensation of water &amp; grease onto floor</li> <li>• Provide adequate lighting to keep work areas, aisles &amp; paths of travel well lit</li> <li>• Mark/highlight step edges &amp; transition areas (changes in elevations)</li> <li>• Use anti-skid paint, slip-resistant coatings &amp; strips</li> </ul>	3,000.0
						<ul style="list-style-type: none"> <li>• Ensure stairs have sufficient lighting &amp; hand rails</li> </ul>	1,000.0
						<ul style="list-style-type: none"> <li>• Provide effective drainage, false floors or work platforms</li> <li>• Install slip-resistant floors in high risk areas.</li> </ul>	1,000.0
		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><b>If manual lifting must be done then:</b></p> <ul style="list-style-type: none"> <li>• Get a secure grip.</li> <li>• Use both hands whenever possible.</li> </ul>	

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>• Avoid jerking by using smooth, even motions.</li> <li>• Keep the load as close to the body as possible.</li> <li>• To the extent feasible, use your legs to push up and lift the load, not the upper body or back.</li> <li>• Do not twist your body. Step to one side or the other to turn.</li> <li>• Alternate heavy lifting or forceful exertion tasks with less physically demanding tasks.</li> <li>• Take rest breaks.</li> <li>• <b>When working with Power Tools:</b></li> <li>• Never carry a tool by the cord or hose.</li> <li>• Never yank the cord or the hose to disconnect it from the receptacle.</li> <li>• Keep cords and hoses away from heat, oil, and sharp edges.</li> <li>• Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.</li> </ul>
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**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>• Keep all people not involved with the work at a safe distance from the work area.</li> <li>• Secure work with clamps or a vise, freeing both hands to operate the tool.</li> <li>• Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.</li> <li>• Maintain tools with care; keep them sharp and clean for best performance.</li> <li>• Follow instructions in the user's manual for lubricating and changing accessories.</li> <li>• Be sure to keep good footing and maintain good balance when operating power tools.</li> <li>• 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."</li> </ul>	
		Electric Shock	During installation	8 months	Major	<ul style="list-style-type: none"> <li>• A tagging system to identify faulty equipment or equipment under maintenance or installation be established.</li> </ul>	1,000.0

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>• Clock-in, clock-out and duty/equipment handing over system be established at all work sites</li> <li>• Use of only adequately trained personnel be used for any particular task - the Contractor MUST not, under no circumstance, use personnel that</li> </ul>	
						<ul style="list-style-type: none"> <li>• are not adequately trained or faulty/unsuitable equipment for any task.</li> <li>• Proper outage system on live equipment to be worked must be established and enforced.</li> </ul>	
4	Socio-Economic	Movement of vehicles and equipment.	Delivery of equipment to site.	1 month	Minor	<ul style="list-style-type: none"> <li>• Traffic detour routes must be prearranged with the Local Government Council.</li> <li>• Access at entry and exit points to works sites should be controlled and</li> <li>• heavy trucks should be assisted by traffic controllers</li> <li>• Ensure that warning signs are clear and visible at night.</li> <li>• Limiting the speed within Site.</li> <li>• Place visually clear instructions in areas close to Construction site.</li> </ul>	1,000.0
		Power Outage	During installation	Intermittently within 8 months	Minor	<ul style="list-style-type: none"> <li>• Outages should be planned in such a manner that the bulk of it would be during low peak hours.</li> </ul>	500.0

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>Sensitization of the impacted customers through radio announcements, newspaper adverts and other public notices.</li> <li>An outage plan should be prepared in conjunction with the Contractor and this should and strictly adhered to by TCN and the Contractor.</li> </ul>	3,000.0
		HIV/AIDS and other STIs	Throughout project life	Throughout project life (24 months)	Major	<ul style="list-style-type: none"> <li>HIV/AIDS Sensitization/awareness campaigns/workshops.</li> <li>Sensitization programmes should</li> <li>Include provisions specially targeting protection for girls and young women, as well commercial sex workers and other members of the community/population around the project area.</li> <li>Voluntary HIV/AIDS testing for Contractor staff.</li> <li>Distribution of condoms.</li> </ul>	50,000.0
		Gender-based Violence and Sexual Exploitation	During construction and installation	Throughout project life (24 months)	Major	<ul style="list-style-type: none"> <li>Minimize influx through local hiring</li> <li>Require the contractor to include in the Contractors Environmental and Social Management Plan (CESMP)</li> </ul>	

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<p>measures to avoid SEA, GBV, or other social conflict, including:</p> <ul style="list-style-type: none"> <li>- mandatory awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically</li> </ul>	
						<ul style="list-style-type: none"> <li>- women;</li> <li>- informing workers about national laws that make sexual harassment, exploitation of children, and gender-based violence a punishable offence which is prosecuted;</li> <li>- 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). The Code of Conduct should include statement against amorous relationship between workers and local women/girls and</li> </ul>	

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

						<ul style="list-style-type: none"> <li>- Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.</li> <li>• 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.</li> <li>• TCN should ensure that contractor’s GRM is robust and operational</li> <li>• Ensure that implementation of the CESMP (or influx management plan if there is one) is an enforceable provision of the construction contract</li> </ul>	
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*Grand Total (i.e. USD 90,000/site x 7 No. sites) = USD 630,000 .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 2.

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. Preliminary stakeholder consultation with selected stakeholders was conducted at the stage of preparing the ESMF and RPF for NETAP but a more comprehensive one will be done during the preparation of the GRM for the project.

#### **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.

## **6.2: 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

## **6.3: 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 7.1 below).

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 NETAP. These training shall include on-shore and off-shore specialized training in environmental management, Occupational Health and Safety, Gender-Based Violence, Sexual Exploitation and Abuse, Gender Mainstreaming, Stakeholder Engagement/Planning. 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. Budget for these trainings have been proposed and approved in the ESMF for NETAP.

## **7.2: Cost of Mitigation**

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 630,000 per site is proposed for the mitigation of the potential impacts associated with the rehabilitation/reinforcement project at the project sites. Table below shows other costs associated with the monitoring of the ESMP including office equipment, basic field tools and training;

**Table 10: Sample Monitoring Checklist**

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"> <li>i. Adequate lighting in dark working areas.</li> <li>ii. Provision of smoke extractors.</li> <li>iii. Installation of industrial fans for adequate ventilation.</li> <li>v. Conservation of energy in the work place - Installation of white energy saver bulbs/flood lamps.</li> <li>v. Working environment must be safe at all times.</li> <li>ii. Use of nose masks when working in areas where smoke/dust is generated.</li> </ul>				
2		Working at height	<ul style="list-style-type: none"> <li>i. Erection of scaffolds</li> <li>ii. Use of Harness</li> <li>iii. Provision of safety net</li> </ul>				
3		Working surfaces	<ul style="list-style-type: none"> <li>i. Protruding sharp/pointed edges of equipment</li> </ul>				
4		Lifting/moving heavy equipment/materials	Heavy equipment/materials should be lifted by mechanized means.				

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

			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"> <li>i. Training should address the task required to be executed by the employee.</li> <li>ii. The duration of the training should be sufficient for the complete delivery of the subject matter.</li> <li>iii. The training MUST be conducted by a competent/accredited person in the field in question.</li> <li>iv. The content of the training should address all areas where skill gaps exist.</li> </ul> <p>No personnel MUST be assigned to any task for which he/she has been adequately trained.</p>				

**ESMP (Package 2 – Lot 2: 330/132/33kV T/S at Osogbo (Osun State), Delta IV (Delta State), Benin (Edo State) and 132/33kV T/S at Ilorin (Kwara State), Ondo (Ondo State), Irrua (Edo State), and Effurun (Delta State), October, 2019.**

**Table 11: Capacity Building Needs for the ERSU-PMU Project Team.**

S/N	ITEM	SPECIFICATIONS	UNIT COST (USD)	QUANTITY	SUB-TOTAL (USD)
1	Computer Laptops	MacBook Pro 15.4"	1,800.00	2	3,600.00
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	Apple iMac, 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	2,000.00	5	10,000.00
4	Hand-held GPS	Trimble Geo 7X (with software and license)	10,000.00	2	20,000.00
5	Toyota Hilux	(4x4, full option, double cabin, 2020 model)	75,000.00	2	150,000.00
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	OH&S, @ USD20,000 x 2 persons X 3 yrs	20,000.00	6	120,000.00
<b>GRAND TOTAL</b>					<b>310,400.00</b>

## 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 Osogbo, Delta IV and Benin 330/132kV Transmission Substations and Ilorin, Ondo, Irrua and Effurun 132/33kV Transmission Substations. 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

PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION				
SUBSTATION REINFORCEMENT AND REHABILITATION				
PACKAGE 1				
		REGION		DESCRIPTION
<b>Lot 1</b>				
<b>To be Managed at Kaduna</b>				
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 x 60MVA 132/33kV Transformers, High Voltage Switchgears and Associated Equipment including Digital Control System
4	North West	Kaduna	Dan Agundi	Reinforcement of 1 x 100MVA 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 x 150MVA 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
<b>Lot 2</b>				
<b>To be Managed at Lagos</b>				
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**

		<b>REGION</b>		<b>DESCRIPTION</b>
<b>Lot 1</b>				



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 1No. 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
<b>Lot 2</b>				
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

<b>PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION</b>			
<b>SUBSTATION REINFORCEMENT AND REHABILITATION</b>			
<b>PACKAGE 3</b>			
	<b>REGION</b>		<b>DESCRIPTION</b>
<b>Lot 1</b>			

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.
<b>Lot 2</b>				

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.
<b>PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION</b>				
<b>SUBSTATION REINFORCEMENT AND REHABILITATION</b>				
<b>PACKAGE 3</b>				
<b>Lot 1</b>				
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.
<b>Lot 2</b>				
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.

<b>PROPOSED NETAP PACKAGE AS AT 23/11/2017 - US\$486 MILLION</b>		
<b>SUBSTATION REINFORCEMENT AND REHABILITATION</b>		
<b>PACKAGE 4</b>		
<b>SUPPLY OF POWER EQUIPMENT</b>		
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

<b>PACKAGE 5</b>				
<b>132kv Line Reconstruction and Reconductoring</b>				
<b>PACKAGE 5A (Lot 1)</b>				
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 <b>Tie-Off</b> (22.1km) and Creation of Additional 132kV Line Bays at Osogbo abd 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)
<b>PACKAGE 5B (Lot 2)</b>				
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	Reconductering of the Entire Route Length from Gombe - Biu -Damboa - Maiduguri 132kV line of 356km Route Length

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

## 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:

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

#### **i. 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.

#### **ii. 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.

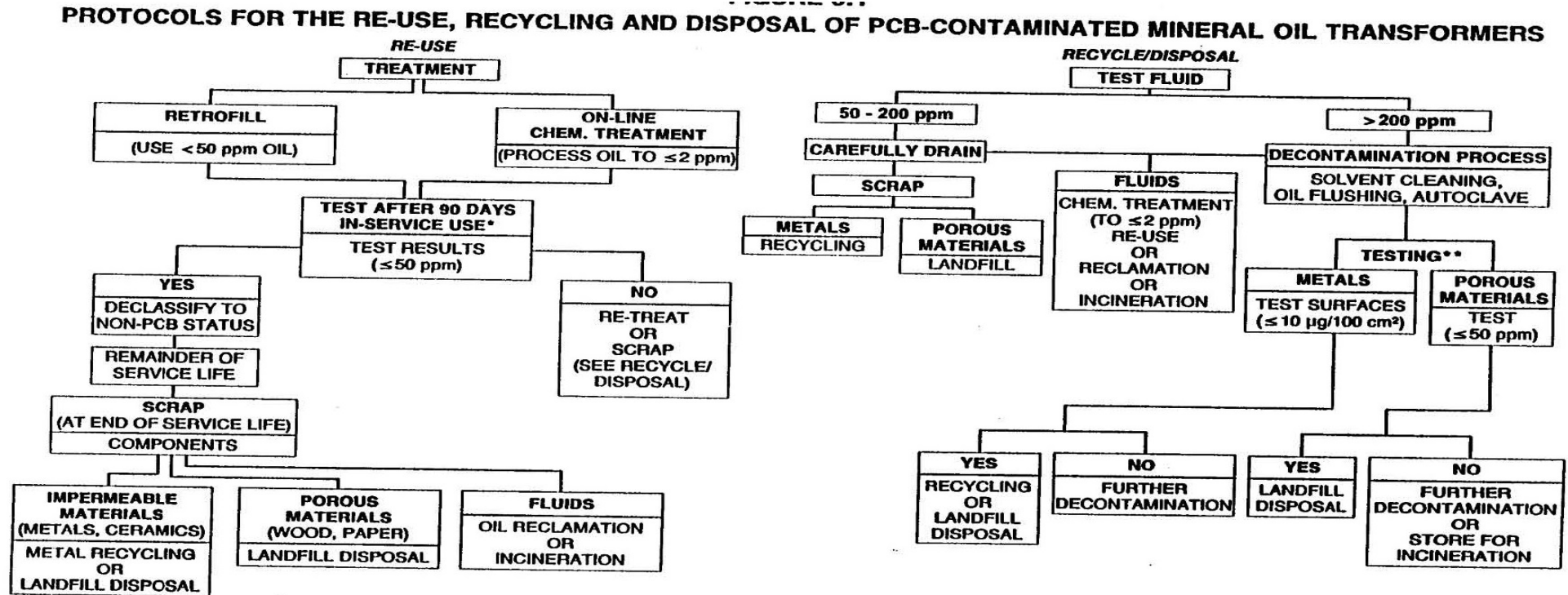
**iii. Mineral oil transformers (see illustrations in figure Below)**

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  $\leq 2$ ppm, this fluid can be reused or incinerated.

**iv. 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 42: Protocol for the Re-Use, Recycling and Disposal of PCB Contaminated Mineral Oil Transformers

**NOTES**

- PCB TRANSFORMER OWNERS WHO HAVE DEMONSTRATED TO REGULATORY AUTHORITIES THAT THEIR TRANSFORMER RETROFILLING METHODOLOGY PROVIDES FOR:
  - THE REMOVAL OF AT LEAST 90% OF THE ORIGINAL FLUID THROUGH CAREFUL DRAINING; AND
  - THE PCB CONCENTRATION OF THE REPLACEMENT FLUID TO BE INCLUDED IN THE CALCULATION OF THE END POINT PCB CONCENTRATION OF THE TRANSFORMER'S FLUID,
 BE ALLOWED TO PROCEED (THROUGH SPECIAL PERMITTING) DIRECTLY TO DECLASSIFICATION WITHOUT THE 90 DAY TESTS FOR TRANSFORMERS WITH INITIAL PCB CONCENTRATIONS  $\leq 500$  ppm.
- PCB TRANSFORMER OWNERS WHO HAVE DEMONSTRATED TO REGULATORY AUTHORITIES THAT THEIR DECONTAMINATION METHODS RELIABLY RESULT IN  $\leq 50$  ppm IN THE POROUS MATERIALS AND  $\leq 10 \mu\text{g}/100 \text{ cm}^2$  ON THE METAL SURFACES SHOULD BE ALLOWED (THROUGH SPECIAL PERMITTING) TO PROCEED DIRECTLY TO SCRAPPING WITHOUT FURTHER TESTING FOR TRANSFORMERS WITH INITIAL PCB CONCENTRATIONS OF 200-500 ppm.

Figure 43: Protocol for the Re-Use, Recycling and Disposal of Askarel Transformers

