



**SIMPLIFIED ENVIRONMENTAL STUDY
REPORT FOR THE 60 KV DISTRIBUTION
LINE PROJECT BETWEEN THE 220/60 KV
EAST LUBANGO SUBSTATION AND THE
60/15 KV ARIMBA SUBSTATION IN
LUBANGO, HUÍLA PROVINCE**



FEBRUARY 2023



**Simplified Environmental Study
Report for the 60 kV Distribution Line Project between
the 220/60 kV East Lubango Substation and the 60/15 kV
Arimba Substation in Lubango, Huíla Province**



Client:

Empresa Nacional de Distribuição de Electricidade - E.P.

Address: Cónego Manuel das Neves 234, Luanda

Telephone: (+244) 222 641 760

Website: www.ende.co.ao/

Tokyo Electric Power Services Co., Ltd. (TEPSCO)

Address: 9F KDX Toyosu Grand Square 1-7-12

Shinonome, Koto-Ku, Tokyo 135-0062 Japan

Telephone: (+813) 6372 5183

Website: www.tepsco.co.jp

Contact Person (ENDE)

Mr. Luciano Vidal Gonçalves

Manager

Telephone: (+244) 925 471 166

E-mail: vidalgoncalves@yahoo.com.br

Version	Date	Description
V.1	15/01/2022	Chapters 1 to 4 for review
V.2		Final draft for client's review
V.3	24/03/2022	Final report for client's review
V.4	02/05/2022	Updated report for approval
V.5	15/08/2022	Updated report for approval
V.6	20/28/2023	Updated report for JICA final

Consultant

Holísticos, Lda. – Serviços, Estudos &
Consultoria

Rua 60, Casa No. 559

Urbanização Harmonia

Lar do Patriota

Luanda, Angola

Telephone:

(+244) 927 442 844

(+244) 915 034 779

(+244) 226 434 549

E-mail:

holisticos@holisticos.co.ao

Website:

www.holisticos.co.ao

Facebook:

<http://www.facebook.com/holisticos.angola>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

TABLE OF CONTENTS

1.	INTRODUCTION	1-1
1.1.	Project Promoters and Consultancy Company.....	1-1
1.2.	SES Justification	1-4
1.3.	SES Objectives	1-5
1.4.	SES Scope Report.....	1-6
1.5.	Terms of Reference	1-6
1.6.	SES Methodology.....	1-7
2.	PROJECT DESCRIPTION	2-1
2.1.	Project Justification	2-1
2.2.	Project Location.....	2-1
2.3.	Areas of Influence.....	2-5
2.4.	Description of the Distribution Line	2-8
2.5.	East Lubango and Arimba Substations Description.....	2-14
2.6.	Water.....	2-14
2.7.	Waste Management.....	2-15
2.8.	Work Schedule	2-15
2.9.	Workforce and Investment Budget.....	2-16
2.10.	Operation and Maintenance Phase.....	2-16
2.11.	Alternative Locations.....	2-17
3.	INSTITUTIONAL AND LEGAL FRAMEWORK.....	3-1
3.1.	Institutional Framework	3-1
3.1.1.	Ministry of Energy and Water	3-1
3.1.2.	Ministry of Culture, Tourism and Environment	3-3
3.1.3.	Ministry of Transport.....	3-6
3.1.4.	Ministry of Agriculture and Fisheries	3-6
3.1.5.	Government of Huíla Province	3-7
3.2.	National Legislation	3-7

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

3.3.	Land Acquisition Process for Distribution Line	3-13
3.4.	JICA Guidelines for Environmental and Social Considerations (2010)	3-15
3.5.	International Finance Corporation Guidelines	3-20
3.5.1.	IFC Environmental, Health and Safety Guidelines.....	3-22
3.5.2.	IFC Environmental, Health and Safety for Electric Power Transmission and Distribution.....	3-22
3.6.	International Commission on Non-Ionizing Radiation Protection	3-23
3.7.	International Legislative Framework.....	3-24
4.	ENVIRONMENTAL AND SOCIAL BASELINE.....	4-1
4.1.	Physical Environment	4-1
4.1.1.	Climate	4-1
	Temperature.....	4-2
	Cloud Cover	4-3
	Winds.....	4-4
4.1.2.	Geology	4-5
4.1.3.	Geomorphology	4-6
4.1.4.	Pedology	4-8
4.1.5.	Air Quality	4-10
4.1.6.	Noise and Vibration	4-15
4.1.7.	Vegetation	4-19
4.1.8.	Fauna	4-20
	Birds.....	4-21
	Potentially Affected Bird Species	4-28
	Mammals.....	4-29
	Amphibians.....	4-30
	Reptiles	4-31
4.1.9.	Environmental Landscape	4-33
4.1.10.	Environmental Conservation Areas	4-36

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

4.2.	Socioeconomic Baseline	4-41
4.2.1.	Huíla Province Profile	4-41
4.2.2.	Demography	4-41
4.2.3.	Electricity and Water Distribution	4-43
4.2.4.	Education	4-45
4.2.6.	Land Use and Territorial Planning	4-48
4.2.7.	Security	4-55
4.2.8.	Ecosystem Services	4-56
4.2.9.	Economy and Livelihoods	4-57
4.2.10.	Tourism and Cultural Heritage	4-60
4.2.11.	Infrastructure of Transport	4-62
4.2.12.	Telecommunications	4-63
4.2.13.	Industrial Sector	4-63
4.2.14.	Ethnicity and Religion	4-63
4.2.15.	Housing	4-63
4.2.16.	Infrastructures on the Project Route	4-64
4.3.	Stakeholder Engagement Meetings	4-64
4.3.1.	Stakeholder Engagement Strategy	4-64
4.3.2.	Summary of the Stakeholder Meetings	4-65
5.	IMPACT ASSESSMENT AND MITIGATION MEASURES	5-1
5.1.	Methodology for Assessment of the Environmental and Social Impacts	5-1
5.2.	Identification of the Project’s Main Actions Generating Impacts on the Environment.....	5-5
5.2.1.	Physical Environment	5-7
	Climate	5-7
	Geology and Geomorphology	5-7
	Soils	5-8
	Waste.....	5-10

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Air Quality	5-11
Sound Environment and Vibration	5-14
Water Resources (Quality)	5-16
Landscape	5-18
5.2.2. Biotic Environment	5-20
Habitats, Vegetation and Flora	5-20
Fauna	5-23
Ecosystem Services	5-25
5.2.3. Social and Cultural Component	5-26
Social Aspects	5-26
Historical and cultural aspects	5-29
5.2.4. Economic and Legal Component	5-30
Economic Framework	5-30
Legal Framework	5-32
6. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	6-1
6.1. Environmental and Social Management Plan	6-1
6.2. Waste Management Plan	6-44
6.3. Occupational Health, Safety and Environment Program	6-44
6.4. Construction Management Plan	6-44
6.5. Emergency Preparedness and Response Plan	6-45
6.6. Traffic Management Plan	6-45
7. FINAL CONSIDERATIONS	7-1
8. BIBLIOGRAPHY	8-1

Appendices

- Appendix 1 – Holísticos’ Certificate
- Appendix 2 – Waste Management Plan
- Appendix 3 – List of Birds of the Project
- Appendix 4 – List of Mammals
- Appendix 5 – Amphibians List

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Appendix 6 – Reptiles List

Appendix 7 – Minutes of the Stakeholder Meetings

Appendix 8 – Proof of Project Registration at SIA

Appendix 9 – Environmental Monitoring Form

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

List of Figures

Figure 2-1: Location map of the 60 kV distribution line Project. 2-3

Figure 2-2: Location map of the Arimba substation. 2-4

Figure 2-3: Area of influence of the Arimba Substation. 2-7

Figure 2-4: Right-of-way widths required for the 60 kV distribution line..... 2-9

Figure 2-5: Restrictions on the land use within the DL route. 2-10

Figure 2-6 Type of tower structure proposed to use in 60 kV DL Project..... 2-13

Figure 2-7: Layout of Arimba substation..... 2-14

Figure 2-8: Project's alternatives routes mapped..... 2-17

Figure 3-1: Energy-related Organizations in Angola. 3-2

Figure 3-2: Representation of the Angolan Environmental Impact Assessment process for Simplified Environmental Study. 3-5

Figure 4-1: Map of Angola according to Koppen’s climate classification. Black rectangle: project area (Huíla Province). 4-2

Figure 4-2:Average temperature in Southwest Angola. 4-3

Figure 4-3: Cloudiness in Southwest Angola..... 4-4

Figure 4-4: Average wind speed in Huíla Province..... 4-5

Figure 4-5: Geological setting of Huila province. 4-5

Figure 4-6: Main geomorphologic and landscape units of Angola 4-8

Figure 4-7: a) Main soil classes in Angola (adapted from Sertoli, 2009 in Ngongo, 2014). b) Predominant soils in southwest Angola. Rectangle: study area. 4-10

Figure 4-8: Particulate matter measuring instrument used. 4-12

Figure 4-9: Location of the particulate matter sampling points. 4-14

Figure 4-10 Evidence of noise measurements (photos, graphs, measuring points and equipment used). 4-18

Figure 4-11: Bird species observed in the distribution line route..... 4-29

Figure 4-12: Reptile species observed in the distribution line route..... 4-33

Figure 4-13: Environment around the Arimba substation and distribution line. 4-36

Figure 4-14 Environmental Conservation Areas in Angola and their location..... 4-37

Figure 4-15: Important IBAs in Angola (number 23 is Tundavala in Huíla)..... 4-38

Figure 4-16: Population distribution in Huíla. **Source:** INE, 2016. 4-42

Figure 4-17: Main type of energy source in Huíla Province..... 4-43

Figure 4-18: Households using appropriate sanitary facilities by area of residence. 4-45

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Figure 4-19: Instituto Superior Politécnico da Huíla	4-47
Figure 4-20: Detail of the houses of the Project’s neighbourhood.....	4-50
Figure 4-21: Neighbourhood around the Arimba substation and distribution line.....	4-52
Figure 4-22: Stakeholders along the proposed distribution line and Arimba substation.....	4-53
Figure 4-23: Google Earth images from the Project site taken between 2010-2021.	4-55
Figure 4-24: Raising cattle in Poaires Muhaha.....	4-59
Figure 4-25: Cristo Rei Monument in Lubango.	4-61
Figure 4-26: Road network of Huila province.	4-62

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

List of Tables

Table 1-1: Contacts of the Project Promoter.	1-2
Table 1-2: Contacts of the Consultant Company.	1-3
Table 1-3: List of experts involved in the SES Report.....	1-3
Table 2-1: Minimum safety distances from the distribution line in relation to different structures.	2-8
Table 2-2: Daily water consumption.	2-15
Table 2-3: Preliminary project schedule.	2-16
Table 2-4: Comparison of impacts without project implementation.	2-18
Table 2-5: Alternative analysis for the 60 kV distribution line route.....	2-19
Table 3-1: Summary of National Legislation Applicable to the Project.	3-8
Table 3-2: Phases of the formal and informal land concession processes.	3-14
Table 3-3: Gap analysis between JICA Guidelines and Angola’s institution/legislation systems on the environmental and social considerations	3-17
Table 3-4: The Performance Standards of the International Finance Corporation.	3-20
Table 3-5: Multilateral Environmental Agreements relevant to the Project.	3-24
Table 4-1: Results of particulate matter measurements in the Project region (PM _{2.5}).	4-12
Table 4-2: Results of particulate matter measurements in the Project region (PM ₁₀).	4-13
Table 4-3: IFC Air Quality Guidelines.....	4-14
Table 4-4: Shows the noise sources and noise levels and the corresponding typical tolerance levels. 4-15	
Table 4-5: Noise levels according to IFC guidelines on EHS.....	4-16
Table 4-6: Results of the measurements carried out in the project area.....	4-17
Table 4-7: List of plant species in the Project Area.....	4-19
Table 4-8: List of bird families in the Project Area.....	4-23
Table 4-9: Angolan IBAs and respective classification criteria.....	4-38
Table 4-10: Proposed Ramsar sites in Angola.....	4-40
Table 4-11: Resident population by area of residence, considering gender.	4-41
Table 4-12: Households by main source of energy used for cooking.	4-44
Table 4-13: Households by main source of drinking water.	4-45
Table 4-14: Resident population with 5 or more years according to the level of education completed and gender.	4-46
Table 4-15: Types of building material for houses by commune.....	4-49
Table 4-16: Types of construction material of the houses ceiling by commune.	4-49

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Table 4-17: Types of building materials of the floor of the houses by commune.	4-49
Table 4-18: Cultural sites potentially affected by the proposed project area.	4-61
Table 4-19: Main infrastructures mapped in the right-of-way and within a 500 m radius of the Project route in the Poiaras region.	4-64
Table 4-20: Summary of key questions from the stakeholders in Arimba (Phase 1).	4-65
Table 4-21: Summary of key questions from the stakeholders in Arimba (Phase 2).	4-68
Table 4-22: Summary of key questions from the stakeholders in Lubango municipality (Phase 4).	4-72
Table 5-1: Group A Environment Component.	5-2
Table 5-2: Group B Environmental Component.	5-2
Table 5-3: Description of the Categories vs. Impacts.	5-2
Table 5-4: Probability Categories.	5-4
Table 5-5: Categories of Impact Occurrence.	5-5
Table 5-6: Categories Mitigation Potential.	5-5
Table 5-7: Impact Assessment and Mitigation Measures for Geomorphology.	5-7
Table 5-8: Impact Assessment and Mitigation Measures for Soil.	5-9
Table 5-9: Impact Assessment and Mitigation Measures for Soil.	5-11
Table 5-10: Impact Assessment and Mitigation Measures for Air Quality.	5-12
Table 5-11: Impact Assessment and Mitigation Measures for Sound Environment and Vibrations.	5-14
Table 5-12: Impact Assessment and Mitigation Measures for Water Resources (Qualities).	5-17
Table 5-13: Impact Assessment and Mitigation Measures for Landscape.	5-19
Table 5-14: Impact Assessment and Mitigation Measures for Habitats, Vegetation and Flora.	5-22
Table 5-15: Impact Assessment and Mitigation Measures for Fauna.	5-24
Table 5-16: Impact Assessment and Mitigation Measures for Ecosystem Services.	5-26
Table 5-17: Impact Assessment and Mitigation Measures for the Social Aspects.	5-27
Table 5-18: Impact Assessment and Mitigation Measures for the Economic Framework.	5-31
Table 5-19: Impact Assessment and Mitigation Measures for the Legal Framework.	5-33
Table 5-20: Environmental Impact Assessment Matrix for construction and operational phases for the Project.	5-34
Table 6-1: Environmental and Social Management Plan for entire project phase.	6-3
Table 6-2: Environmental and Social Management Plan.	6-9
Table 6-3: Environmental Monitoring Plan.	6-34

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Acronyms

ADB	Asian Development Bank
ADI	Area of Direct Influence
AGT	Administração Geral Tributária (General Tax Administration)
ANR	Agência Nacional de Resíduos (National Waste Agency)
Aol	Area of Influence
AREA	Autoridade Reguladora de Energia Atómica (Atomic Energy Regulatory Authority)
BCC	Benguela Current Convention
CBD	United Nations Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CR	Critically Endangered
DAA	Directly Affected Area
DNEE	Direcção Nacional de Energia Eléctrica (National Directorate of Electricity)
DNPAIA	Direcção Nacional de Prevenção e Avaliação dos Impactes Ambientais (National Directorate for Prevention and Environmental Impact Assessment)
EBSA	Ecologically or Biologically Significant Marine Area
EDL	Luanda Electricity Company (Empresa de Electricidade de Luanda)
EHS	Environment, Health and Safety
ELF	Extremely Low Frequency
EN	Endangered
ENDE	National Company for Electricity Distribution (Empresa Nacional de Distribuição de Energia)
ENE	National Electricity Company (Empresa Nacional de Electricidade)
EPC	Engineering, Procurement and Construction
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agricultural Organization
HSE	Health, Safety and Environment
IBA	Important Bird and Biodiversity Area
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IFC	International Finance Corporation
IIA	Area of Indirect Influence
INAVIC	Instituto Nacional da Aviação Civil (National Institute of Civil Aviation)
INBC	Instituto Nacional da Biodiversidade e Conservação (National Institute for Biodiversity and Conservation)
INE	Instituto Nacional de Estatística (National Institute of Statistics)
INGA	Instituto Nacional de Gestão Ambiental (National Institute for Environmental Management)
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
JNCC	Joint Nature Conservation Committee
KBA	Key Biodiversity Area
LBA	Lei de Bases do Ambiente (Environment Framework Law)
LRBA	Lei dos Recursos Biológicos Aquáticos (Aquatic Biological Resources Act)
MCTA	Ministry of Culture, Tourism and Environment (Ministério da Cultura, Turismo e Ambiente)
MINEA	Ministry of Energy and Water (Ministério da Energia e Águas)
MW	Megawatts
NBSAP	National Biodiversity Strategy and Action Plan
NIR	Non-Ionizing Radiation

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

NTS	Non-Technical Summary
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PDP	Provincial Development Plan
PNA	National Water Plan
PNGA	National Environmental Management Plan
PSs	Performance Standards
PVC	Polyvinyl chloride
RNT	National Electricity Transportation Network (Rede Nacional de Transporte de Electricidade)
RoW	Right of Way
SES	Simplified Environmental Study
SIA	Integrated Environment System (Sistema Integrado do Ambiente)
TEPSCO	Tokyo Electric Power Company
ToR	Terms of Reference
TWA	Time Weighted Average
USAID	United States Agency for International Development
WB	World Bank
WMP	Waste Management Plan

CHAPTER 1

INTRODUCTION

1. INTRODUCTION

The increased growth in electricity consumption in recent years in Angola is associated with the high level of electrification efforts being undertaken by the Angola Government, improving population living conditions resulting in higher electricity consumption. However, despite the significant increase in available generation capacity achieved in recent years, demand is still suppressed, with frequent cuts in the power supply, as well as the generalized use of generators for self-consumption, with higher incidence in the hot season months due to the use of air conditioning. To this, it is also associated with the fact that some energy infrastructures, namely substations, are at the limit of their action, some of which need improvement of equipment among others.

With the aim of improving the electricity supply, in Huíla province, the Government of Angola through this project, intends to leverage the development of the province by providing infrastructures which, in addition to boosting the agricultural, commercial, hotel, industrial and mining sectors, will also significantly improve the conditions of the population of this province especially providing an environment for attracting investment and job creation.

The present document is a Simplified Environmental Study (SES) Report concerning to the potential environmental effects of the Project and its operations. The SES recommends measures to reduce potentially harmful impacts and enhance any benefits. This SES report addresses specific aspects for the proposed project. This chapter provides a summary of the presentation of the Project and describes the main objectives of the SES, and the justification of the Project in the local and regional context, clarifying the site location and areas of influence. It also presents the consultants involved in the SES development, its methodology and report structure.

The proposed project consists of the installation of a 60 kV Distribution Line (DL) of approximately 10 km, between the East Lubango Substation and the Arimba Substation and an underground 60 kV DL of 500m between Arimba Substation and Arimba 2 Power Plant, and construction of the 60/15 kV Arimba Substation in Lubango municipality, Huíla Province.

1.1. Project Promoters and Consultancy Company

According to the request from the Government of Angola to the Government of Japan, this Project is expected to be implemented by the Japanese Official Development Assistance (ODA) loan, and the National Company for Electricity Distribution - E.P. (ENDE), is the **Project Proponent**, Angolan entity representative. The preparatory survey for this Project has been implemented by Japan International Cooperation Agency (JICA) since July 2021 with their contractor, Tokyo Electric Power Services Co., Ltd. (TEPCO).

The Japan International Cooperation Agency (hereinafter referred to as JICA) aims to contribute to international cooperation promotion, as well as the development of the Japanese and global economy by supporting the socioeconomic development, recovery, or economic stability of developing regions. In accordance with the Development Cooperation Charter, JICA will work on human security and

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

quality growth, and with its partners will take the lead in forging bonds of trust across the world, aspiring for a free, peaceful, and prosperous world where people can hope for a better future and explore their diverse potentials.

JICA is also advancing its activities around the pillars of a field-oriented approach, human security, and enhanced effectiveness, efficiency, and speed.

TEPCO was established in December 1960 as an affiliated company of Tokyo Electric Power Company, Incorporated (TEPCO) to provide consulting services for electric power industry. TEPCO services cover power sector studies, master plans and feasibility studies supported by multilateral donors such as JICA, World Bank (WB) and Asian Development Bank (ADB). In developing countries facing power sector challenges, TEPCO also carry out project management services (including designs, contract management and construction supervision), with the objective of guaranteeing the sustainability of the Project.

ENDE, the National Company for Electricity Distribution, is a public company with the responsibility of distributing electricity, integrating all the activities and assets of former Luanda Electricity Company (EDEL) and the distribution assets of former National Electricity Company (ENE). The company contacts are shown in **Table 1-1**.

Table 1-1: Contacts of the Project Promoter.

Company	
Company name	National Company for Electricity Distribution - E.P. (ENDE)
Commercial Registry Number	5410778170
Address	Cónego Manuel Das Neves 234, Luanda
Contacts	(+244) 222 641 760
Website	http://www.ende.co.ao
Legal Representative	
Nome	Luciano Vidal Gonçalves
Position	Manager
Telephone	(+244) 925 471 166
E-mail	vidalgoncalves@yahoo.com.br

For the SES development report, **Tokyo Electric Power Services Co., Ltd.** awarded a contract to **Holísticos – Serviços, Estudos & Consultoria, Lda.** which developed this report. Holísticos is an Angolan environmental consulting company, established in 2006, with its headquarters in Luanda, registered in the Ministry of Culture, Tourism and Environment (see **Appendix 1**). Holísticos has a team of dynamic and multidisciplinary specialists with vast work experience in environmental and social issues in Angola (see **Table 1-2** for contact details).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Table 1-2: Contacts of the Consultant Company.

Company	
Company name	Holísticos, Lda. – Serviços, Estudos & Consultoria
Commercial Registry number	299-06
Taxpayer number	5401156421
Environmental Consultant registration number at the Ministry of Culture, Tourism and Environment (MCTA)	12159922221
Address	Urbanização Harmonia, Rua 60, Casa 559, Lar do Patriota, Talatona, Luanda
Telephone	(+244) 226 434 549 / 927 442 844 / 912 034 779
Website	www.holisticos.co.ao
Legal representative	
Name	Miguel Morais, Managing Partner
Address	Rua 60, Casa 559, Urbanização Harmonia
Telephone	(+244) 923 41 01 86
Post office box (Caixa Postal)	2426 Apartado IV
E-mail	holisticos@holisticos.co.ao

For this SES, Holísticos prepared a multidisciplinary team that was involved with the various report activities of the report, namely field work (environmental, social and cultural surveys), analysis of the biotic samples, meetings with the administrative authorities of Huíla Province and development of the final report.

The several Holísticos specialists involved in the SES report and, their respective areas and contributions are described in **Table 1-3**. These specialists have a large experience in providing environmental, social, and cultural consultancy, including electrification and energy transport projects.

Table 1-3: List of experts involved in the SES Report.

Name	Academic Qualifications	Role	Electronic Signature
Vladimir Russo	Master's in Environmental Education	Project Director: Project Director, ESMP and ESIA lead author	
Pedro Vaz Pinto	Forest Engineer and PhD in Conservation Biology	Biodiversity Expert: Fauna – birdlife, and herpetofauna	
Miguel Morais	Biologist, Master's in Sciences of the Sea and Coastal Areas	Biodiversity Expert: Fauna – birdlife, mammals, and impact assessment	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Name	Academic Qualifications	Role	Electronic Signature
Elayne Miranda	Engineer in Natural Resources and Environment	Project Coordinator, Socioeconomic Baseline, Impact Assessment and Stakeholder Engagement	
Eduardo Ferdinand	Engineer in Natural Resources and Environment / Master's in Environmental Audits and Management	Environmental and Social Advisor – Stakeholder Engagement	
Francisco Maiato	Biologist	Environmental Specialist (Flora): vegetation survey	
José Luís	Social Specialist	Social Consultant – Social Baseline and Stakeholder Engagement	
Suzana Bandeira	Biologist, Master in Biological Sciences	Environmental Baseline and document review	
Teresa Ferreira	Engineer in Natural Resources and Environment	Environmental Advisor – Report Review	

1.2. SES Justification

The project is proposed as a part of the Feasibility Study for the construction of a 220 kV transmission line between Lubango and Namibe, which is being carried out with the support of JICA, to establish a stable power distribution system that will contribute to the development of Luanda and surrounding area. This project consists of a 60 kV distribution line between the 60 kV/15 kV Arimba substation, which was planned in the Arimba area by ENDE, and the East Lubango substation, whose construction was decided in the above Feasibility Study.

Given the characteristics of the project, its location, nature and dimension, some environmental and social impacts are expected in the construction and operation phases of the Project (60 kV DL). In accordance with the Appendix III of the Presidential Decree No. 117/20 of April 22nd on the General Regulation for Environmental Impact Assessment and the Environmental Licensing Procedure, this type of project is listed in category C. As such, this SES follows Angolan legislation and considers recommendations proposed by multilateral environmental agreements ratified by Angola. It is also aligned with the JICA Guidelines for Environmental and Social Considerations (April, 2010) which requires that an environmental impact assessment report is required to be publicly available in the country where the project is implemented, including to local communities and other stakeholders, and to be accessible to local communities and other stakeholders at all times, and copies are required to be made available to them.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Subsequently, given the legislation applicable to the implementation of a project of this nature, it must be preceded by a SES that encompasses:

- The report that must address, but is not limited to, the following points:
 - Description of the 60 kV DL project;
 - Project technological alternatives versus the hypothesis of non-execution of the project;
 - Identification and systematic evaluation of the environmental and social impacts generated by construction activities and operation phases of the project, including details regarding specific aspects of the functioning of adopted technologies;
 - Definition of the limits of the geographic area affected directly or indirectly by the impacts, known as the areas of influence of the project, considering, in all cases, the human populations and other living creatures within that area;

Other elements viewed as relevant due to its particularities and characteristics of the project, including its economic importance and in terms of development for the province of Huíla.

1.3. SES Objectives

The objectives of the SES report are the following:

- Describe the project and analyse the environmental and social benefits inherent to the 60 kV DL Project development to construction and operation phases;
- Provide information on the alternatives to avoid, mitigate or reduce potential impacts within sensitive areas, weighting pros and cons for each option and presenting the reasons to support the selection of the preferred options;
- Identify and describe elements of the population and natural and constructed environments that may be affected by the project and potentially cause adverse environmental and socioeconomic impacts;
- Identify adverse environmental and social impacts associated with the project;
- Possess techniques and evaluation methodologies that can be presented to decision makers concerning the damaging effects of the projects to the natural and social environment that are difficult to quantify or evaluate;
- Identify and assess the potential environmental and social impacts, which may be caused by the proposed developments;
- Propose mitigation measures to reduce and/or avoid pollution, environmental disturbance such as soil structure deterioration, soil erosion, habitat fragmentation or loss, and other negative impacts caused during the installation and operation phases of the project, as well as how to define an appropriate environmental monitoring plan.

1.4. SES Scope Report

The SES is an important instrument to identify and mitigate potential negative impacts on the project insertion area because they set out the criteria to be adopted during the execution of constructive actions of the project. In this context and taking into consideration its objectives, the SES scope includes the following:

- Identify the questions and significant environmental and social effects caused by certain actions inherent to the 60 kV DL Project;
- Identify significant effects upon the environment, surrounding population and workers affected by the project, caused by the expected environmental impacts;
- Propose technological alternatives for the execution of the project with minimal environmental interference;
- Facilitate and promote the contacting and informing of the public likely to be affected, understand their values at individual and community levels relating to the quality of the environment;
- Assess the concerns raised by the population during the stakeholder engagement process in relation to the potential impacts of project's activities;

Therefore, the following activities of the project are included in this report:

- Installation of 10 km of 60 kV DL and construction of the 60/15 kV Arimba Substation in Lubango municipality;
- Installation of a 0.5 km long underground distribution line between the Arimba substation and the Arimba 2 power station;
- All the civil engineering works for the installation of the above-mentioned equipment and distribution line.

Detailed information on the project description is provided in **Project Description** section.

1.5. Terms of Reference

The 60 kV DL Project between East Lubango substation and Arimba substation was registered on the Integrated Environment System (SIA) platform of the Ministry of Culture, Tourism and Environment on the January 21st, 2022, as per Terms of Reference (ToR) for Simplified Environmental Study. Following this registration under Protocol number 10269201227, the Ministry of Culture, Tourism and Environment (hereinafter referred to as MCTA) issued recommendations (Protocol No. 10269201227) dated 26th of January 2022 confirming that the Project is category C. MCTA recommended the compliance with the standard Terms of Reference in accordance with Annex I of Executive Decree No. 92/12 of March 1st. MCTA also requested that a Waste Management Plan is developed.

After the SES registration process, the SES was developed containing the information required by the national legislation. Hard copies of the SES report must be prepared in accordance with the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

requirements of Presidential Decree No. 117/20 of April 22nd and will be submitted (in Portuguese) through the Ministry of Energy and Water (MINEA), to be endorsed by MCTA. This report will be submitted to the authorities in September 2022. Once the SES report has been reviewed internally by MCTA's staff a pre-licensing visit will be organized to compare the information contained in the SES report with the conditions on the Project site. At this stage the MCTA might require additional information and decide on the need for a simplified public consultation meeting.

If the SES is subjected to a simplified public consultation process this will typically include a public meeting organized through the National Department for Environmental Impact Assessment and Prevention (DNPAIA). MCTA owns this process, but the proponent of the project will be responsible for the logistical arrangements and associated costs (e.g., per diem fees, venue, refreshments, adverts, invitations and legal fees). Regulations state that the consultation process must take place over a period of five to ten days and the costs are covered by the project developer. The simplified public consultation activity usually takes one day in a venue selected by the DNPAIA.

However, MCTA can establish a period of up to eight days, after the simplified public consultation, for interested and affected parties to provide additional comments and/or questions.

Upon completion of the simplified public consultation process, the final decision as to whether to issue an environmental license will be made by MCTA. If a favourable outcome is received, MCTA will issue, once the license is paid by the Project proponent, the environmental license (installation or operational) for the proposed Project as per Presidential Decree No. 117/20. In the event the ESIA is rejected the proponent may appeal through the administrative courts.

At the end of the process the MCTA will be responsible for issuing the respective environmental licenses which will contain appendices with the proposed mitigation measures, compensation measures and the requirements for environmental monitoring and progress report.

1.6. SES Methodology

For the development of the Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation construction and operation the following methodology was applied:

- Site visits to the areas covered by the project to define and characterize its environmental and social baseline conditions, including the identification of potential environmental and social impacts;
- Interviews with Project representatives, Provincial and Municipal authorities in Huíla province and stakeholder engagement with residents and potential beneficiaries along all areas affected by the project implementation, collecting information about the project area (presented in **Chapter 4**);
- Relevant literature review of the project areas and surroundings as well as identification of potential social and environmental impacts.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The development of this SES and the social and environmental field survey was made with a combination of methodologies for quantitative indicators (data) and qualitative indicators (*in situ* information). The site visits, for social and environmental data collection, were performed during the period between August and November 2021 in the areas covered by the project.

In addition to the meetings held during the development of this SES report an additional stakeholder meeting will be organised to meet JICA's requirements. This will include a consultation meeting with residents, local government officials, and officials of institutions in the Lubango municipality. This meeting will serve the purpose to present the SES report and to obtain feedback from interested and affected parties. This meeting was held on 6 June 2022.

CHAPTER 2

PROJECT DESCRIPTION

2. PROJECT DESCRIPTION

This chapter explains the location of the 60 kV DL project (between the East Lubango substation and the Arimba substation), and gives a more detailed description of the characteristics and specificities for the installation of 60 kV DL with 10 km length and the construction of 60/15 kV Arimba substation next to the existing Arimba Power Plant. This section presents the project description for both construction and operation phases (including equipment to be installed, workforce, works schedule as well as labour needs), alternative location and the possibility of non-implementation of the Project.

2.1. Project Justification

The project is proposed as a part of the Feasibility Study for the construction of a 220 kV transmission line between Lubango and Namibe, which is being carried out with the support of JICA, to establish a stable power distribution system that will contribute to the development of Lubango and Moçâmedes areas. This project consists of a 60 kV transmission line between the 60 kV/15 kV Arimba substation, which was planned in the Arimba area by ENDE, and the East Lubango substation, whose construction was decided in the above FS.

Electricity supply to Lubango, the capital of Huila, is provided by the Matara hydroelectric power station (30 MW) in the north of the province, which is interconnected by a 150 kV transmission line, and two diesel power stations located adjacent to and around the Lubango substation, which is connected to the distribution line (15 kV). The power system is also connected to Namibe substation by a 60 kV transmission line.

The possible output of the power plants has been significantly reduced, and this is due to age-related deterioration of the diesel generators themselves.

As the demand is 69 MW at peak times, compared to a possible generation output of approximately 62 MW, there is a shortage of supply capacity, so rotating blackouts (2 hours in each district) are carried out for four hours a day (18:00-22:00) in different districts.

As a result of discussions between RNT, ENDE, and the JICA Survey Team, in order to resolve the current demand crunch in the Lubango area and to respond appropriately to the expected future growth in demand when the 220 kV Lubango - Namibe transmission system, which is currently under study in parallel, is developed. The construction of a new 220/60 kV East Lubango substation in the eastern part of Lubango and the stable supply of electricity from this substation to Lubango area via the new 60/15 kV Arimba substation has been assessed as very effective in terms of facility planning and reliability.

2.2. Project Location

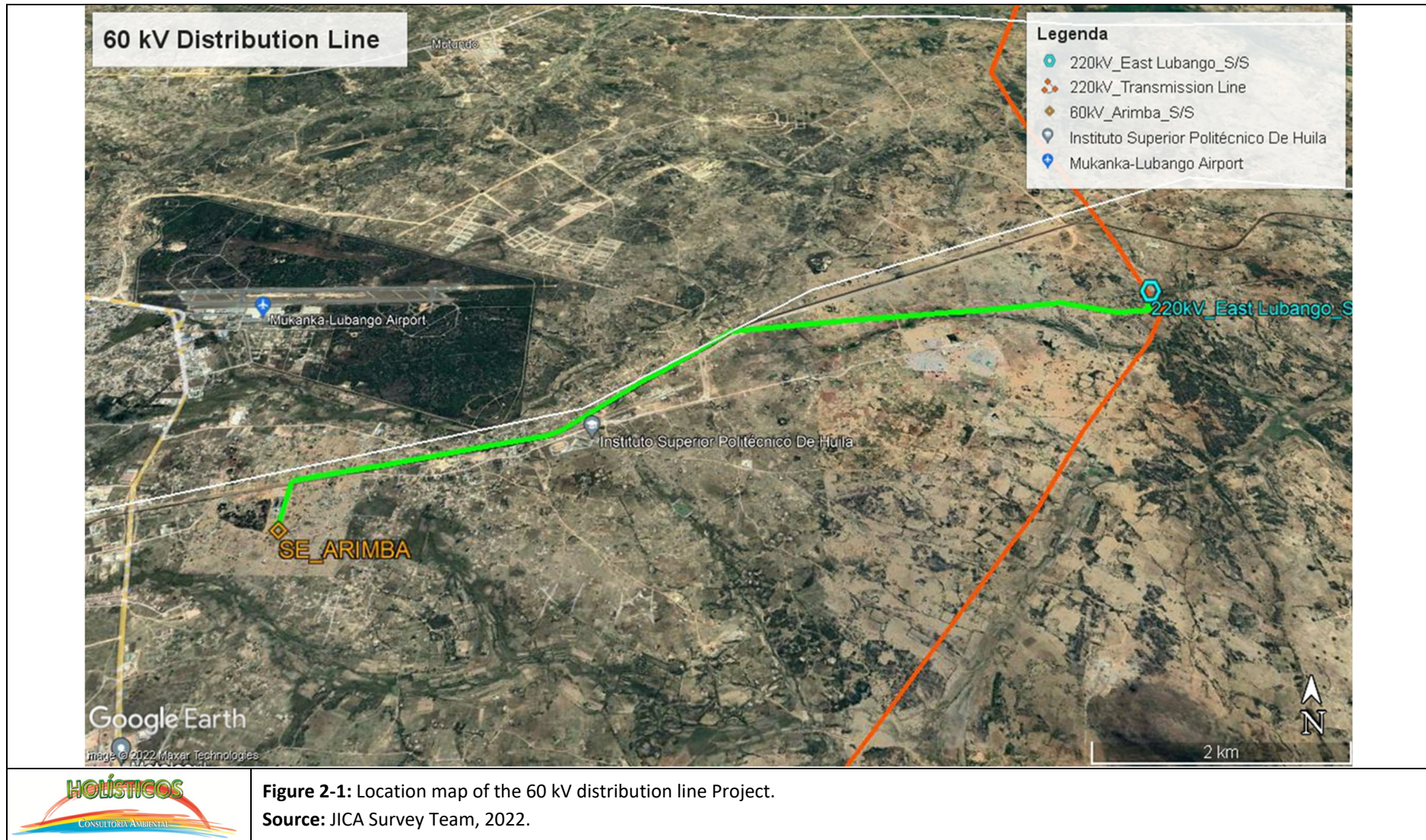
The proposed 60 kV DL project of about 10 km length is located between the East Lubango substation and the Arimba substation in Huíla province. The proposed 60 kV DL with the footprint and the 60/15

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Arimba substation are summarised in **Figure 2-1 and Figure 2-2**. In **Figure 2-2** the orange line shows the underground connection between Arimba Substation and Arimba 2 Power Plant while the green line shows the 60 kV DL.

The coordinates for the Arimba Substation are as follows: 14°57'14.58"S; 13°34'48.83"E. It should be noted that the Arimba Substation is located approximately 2.6 km south of the airport.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province





2.3. Areas of Influence

The definition of a Project's area of influence allows the establishment of geographical boundaries of areas subject to change, in a positive or negative, direct or indirect, permanent or temporary way allowing the establishment of guidelines leading to the assessment of possible environmental and social impacts. To define the areas of influence of this project, topographic, physiological, climatic, and biological aspects were considered, as well as possible changes in the socio-economic context and quality of life of the population existing in the directly and indirectly affected area, and in this case Lubango municipality was considered. Given the characteristics of the project, its location, and the aim of clarifying the degree of impact of the project on environmental and social issues, three areas of influence were defined for this project, namely:

- Directly Affected Area (DAA);
- Area of Direct Influence (ADI);
- Area of Indirect Influence (All).

Directly Affected Area (DAA): characterized by the area affected by the direct footprint of the Project (e.g., physical implantation of the Project and associated infrastructure). It includes the implementation of physical structures and distribution line support infrastructures (such as RoW – Right-of-Way) within 24 meters, 12 meters to each side from the central demarcation of the towers (60 kV), substation and construction sites inside the perimeter of the Project area. This DAA is applicable for the social and environmental components.

Area of Direct Influence (ADI): determined based on the potential direct impacts that are likely to be caused by Project activities. The ADI is the surrounding Project areas, access roads and associated traffic which could result vegetation removal and dust dispersion.

The environmental ADI includes 250 meters around of the Project site. Direct impacts may occur here as a result of construction phase (namely removal of vegetation, setting up accesses and installation of overhead power lines) and operation of overhead power lines (including the line maintenance works), and construction and operation of substation. This category will include all the definitive and/or temporary route that will offer direct access to project implementation sites and to other sites nearby that may undergo temporary improvements to facilitate construction activities.

Mitigation measures will be developed for this category. From the socioeconomic perspective, the Social ADI includes the Lubango municipality where workers and raw materials could be provided for the Project.

Area of Indirect Influence (All): is defined for both, environmental and social components, by the broader the Huíla province context, with respect to future energy provision by connecting to the national grid and are those subjected to Project Indirect Impacts such as sites for obtaining raw materials and water abstraction for the construction and operation phases (which are outside the scope of this SES report). The All also includes promotion of socioeconomic activities determined by

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

the needs of the workforce for the construction and operation phases of the Project and the acquisition of goods, materials and civil construction equipment and third-party services (food, telecommunication, transport, safety, etc.).

The following figure (**Figure 2-2**) shows the relevant areas of influence in the Arimba Substation.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

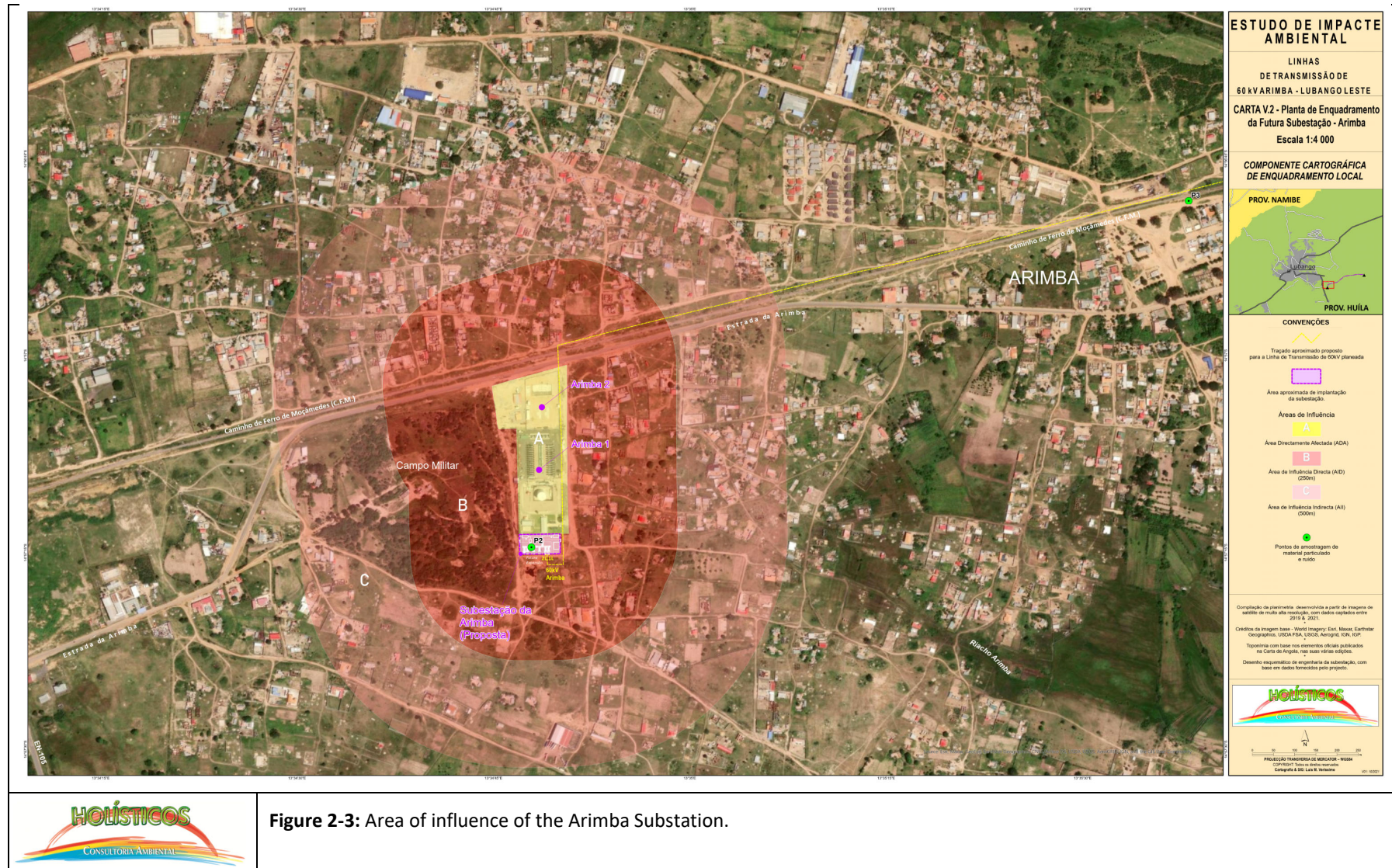


Figure 2-3: Area of influence of the Arimba Substation.

2.4. Description of the Distribution Line

Permanent project components include the electrical infrastructure (60/15 kV 10 km aerial and 500 m underground DLs, control buildings, transformers, transformer bays, line bays, busbars, reactive power compensation, etc.), the tower that will support the overhead distribution line, foundation to support the tower, distribution line markers, and access roads and right of way.

2.4.1. Right-of-Way and Clearances

The 60 kV DL Project avoiding whenever possible to cross:

- Aeronautical or radio service;
- Urban or urban expansion areas and rural residential areas;
- Ecologically and biologically sensitive areas;
- Hospital and school buildings;
- Cultural heritage sites.

The construction of a distribution line requires that procedures to be adopted and standards are put in place to ensure proper installation, reliability and, above all, the safety of everything and everyone around these structures. The ENDE Technical Specification states that there must be a minimum vertical distance of 3 meters between the line and buildings or trees. During the detailed design stage of this project, the engineering team, together with social and environmental experts, will seek to find possible solutions to prevent the loss of structures and trees into distribution line route. Trees within the safety area must be cleaned or pruned for the right-of-way, following the detailed technical specifications of ENDE in order to minimize the cleaning area and ensure that the work is carried out safely. Thus, in the construction and installation of the distribution line along the defined stroke, the safety distances associated with cables contained in **Table 2-1** will be considered.

According to ENDE procedure, a right-of-way (RoW) needs to be maintained to ensure the distribution line safety. The minimum right-of-way widths required for the distribution lines are provided in **Table 2-1** and **Figure 2-4**. These widths take into consideration the distance from adjacent structures under blow-out, the audible noise, as well as electrical and magnetic fields measured at the right-of-way edges. The clearance requirements, e.g., maximum heights permissible for the distribution line, can be found in **Table 2-1**.

Table 2-1: Minimum safety distances from the distribution line in relation to different structures.

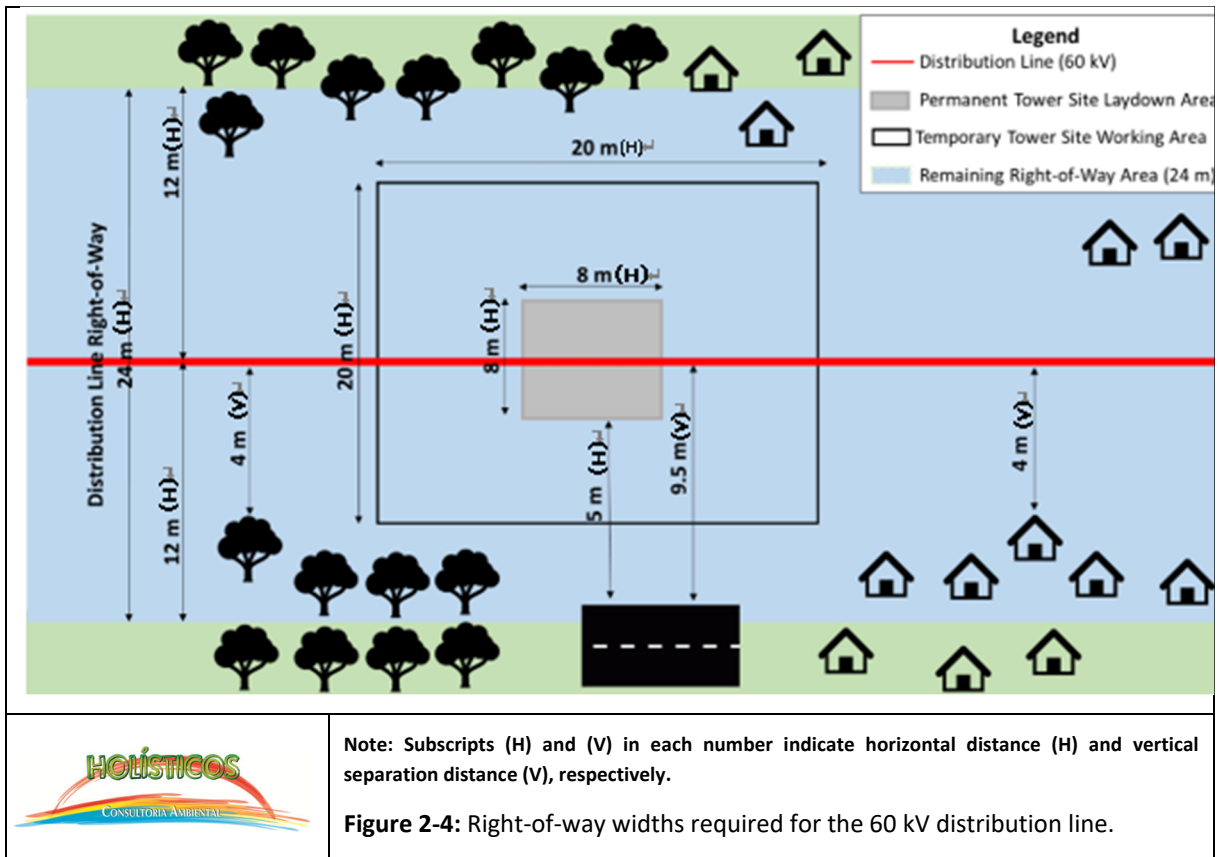
Line Voltage (60 kV)	Distance (m)
Distance from Buildings	4
Distance from the Soil	8.5
Distance from the Trees	4
Distance from National or Municipal Roads	9.5
Crossing Rail Roads and Electrified Roads	13.5 (a)
Crossing Non-Electrified Rail Roads	9.5
Crossing Other Overhead Lines	3.5 (a)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

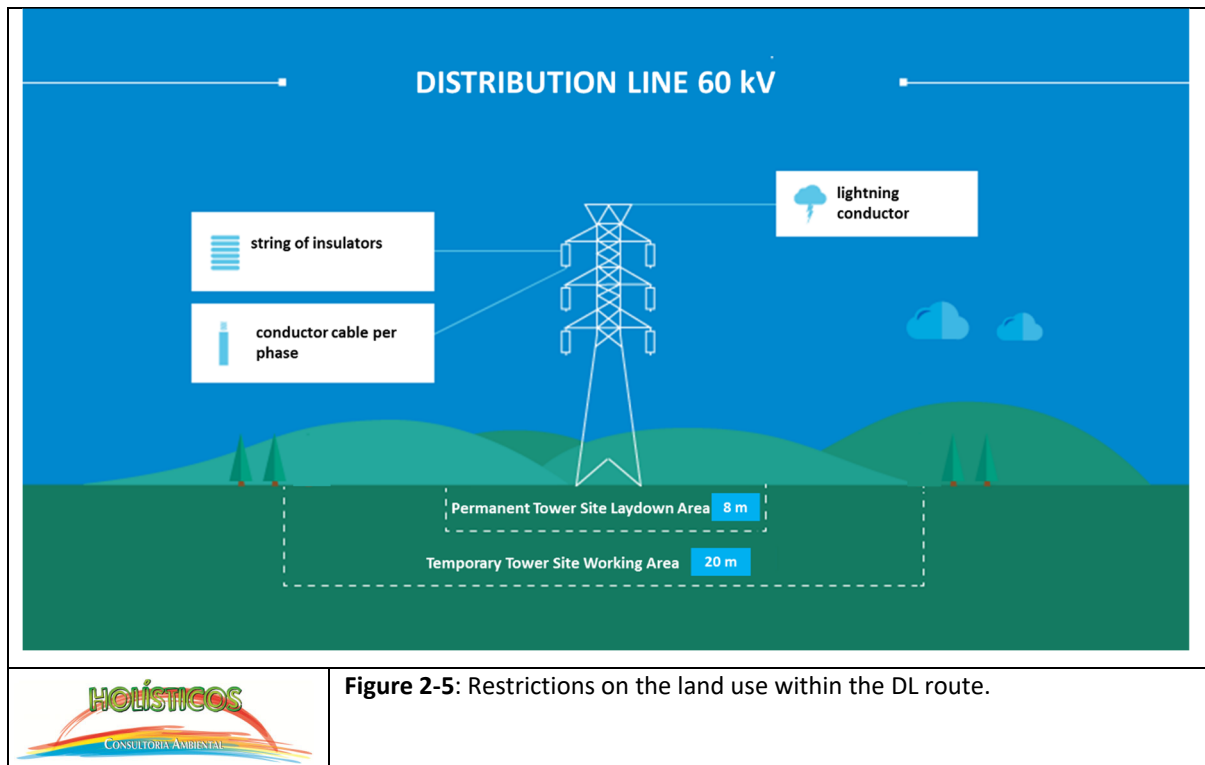
Line Voltage (60 kV)	Distance (m)
Miscellaneous Obstacles	3.5
Crossing Gas Pipelines	10
Crossing Water Lines	10 outside the flood bed
Crossing Roads	5
Crossing Paths	3
Crossing Highways	outside the no-building zone

Note: (a) Considering the crossing point at 200 m from the nearest support structure.

Source: MINEA (2004) ESPECIFICAÇÃO TÉCNICA Projectos de Linhas Aéreas de MAT/AT Sector Eléctrico: (ET-E-119-Ed.A (31.07.2014))



The right-of-way will therefore impose restrictions on the land use within the distribution line route. A 24 meters (12 meters each side) wide strip will be cleared of trees and obstacles within the right-of-way and 8 x 8 m for the towers, see **Figure 2-5**. Access tracks will be required for construction purposes and would remain in place for the operational lifespan of the infrastructure, as they will continue to be used for maintenance. Local and existing access roads and tracks are to be used as far as practicable, with further access and inspection roads created in the right-of-way running along the distribution line where necessary.



For access roads for the project, especially for the transportation of heavy equipment, existing paved roads can be used. However, near the East Lubango Substation, the possibility of using a lining board will be considered.

2.4.2. Site Preparation Activities

ENDE will establish a set of procedures to build securely and install the proposed DL. The construction phase will involve a set of activities that will be carried out sequentially. The site preparation phase will consist of activities such as initial start-up and sanitation work including vegetation removal and tree felling (if necessary and where possible).

Project Start

The project crosses an area, which includes a rural villages/homesteads and associated subsistence activities such as crops and cattle farming. Natural resources, such as pasture for cattle and surface and ground water sources, are also present in the study area.

Land acquisition is required for the proposed project, primarily for the 24 m right-of-way which must be cleared of obstacles to a certain extent (bush clearing), and for the construction of an access road (where it is not feasible to use the existing access roads). MINEA (ENDE) shall grant the builder the right of access and occupation of all DL proposed route and Arimba substation site.

The Engineering, Procurement and Construction (EPC) team will position the intermediate towers based on the approved profile. If necessary, a basic access path will be created for the position of each structure, moving obstacles such as rocks, levelling high points and filling holes. The work will be

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

carried out in order to minimize the impact on the environment in the surrounding area. Existing paths will be used whenever possible and new access will be created to reach the positions of the poles or tower, if the existing accesses are impassable.

Vegetation Removal

When tree felling is required, all activities will be supervised by duly qualified officials. The slow-growing trees will be removed via front loader. All shrubs and trees will be cut into pieces of wood before leaving the site, and then the wood is put on the side of the road, at the disposal of the surrounding communities, to use it as firewood or in construction. Vegetation removal will be as little as possible and will only occur if extremely necessary (removal of vegetation for the right-of-way).

The placement of DL structures will be carried out on the ground defined for each tower, in an area of 8 x 8 m. The tower structure will be mounted and erected on the ground indicated for it. The total area of clean land to accommodate the tower (area for permanent positioning of the tower) is 8 x 8 m. In total, approximately 36 towers will be erected in about 300 meters of distance between each.

Construction Phase Activities

Include implementation activities for DL, site excavation, concrete base construction to support the towers that will accommodate the DL, including the implementation of tips, transport of tower components and other raw materials, assembly and erection of towers and placement of distribution line. In summary, this phase will entail the following (not necessarily as per the order below):

- Mobilising workers, machinery and construction equipment;
- Surveying and development of access roads;
- Clearing vegetation and stripping topsoil within the boundaries of the worker's camp, construction sites, right-of-way, and for each tower point;
- Set up of worker's camp;
- Transport of all the required materials, equipment and components to the worker's camp and to each tower location;
- Movement and operation of heavy machinery and equipment;
- Management of waste produced;
- Clearing trees from the right-of-way;
- Surveying and pegging of towers locations;
- Earthworks associated with the tower and substations foundations/platforms;
- Construction of concrete foundations to support Arimba substation and the towers (including installation of stay-cables to the ground and the installation of support bases);
- Assembling and erecting tower using temporary laydown areas at each tower;
- Laying of cables, conductor stringing, line signalling, aerial beacons and bird diverters - entails unrolling, adjusting and securing of the cables, using the areas around, or between, the towers.
- Installation of temporary protective structures where cables cross over or beneath obstacles (namely roads, railways and other aerial lines);
- Conductor and Optical Ground Wire (OPGW) stringing;

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Building and assembling all required equipment and structures inside the Arimba substation area (usually undertaken by highly qualified teams), including associated buildings and security fencing;
- Commissioning of the substations, which involves carrying out several tests to ensure that the equipment, and the protection and control systems, are properly installed and functioning correctly before the substation commences operation;
- Installing anti-climbing devices on the towers; and
- Demobilising construction work sites and rehabilitating affected areas, including the following actions:
 - Removal/decommissioning of contractor's camps;
 - Removal and disposal of all construction equipment and rubble;
 - Rehabilitation of all areas disturbed by construction works;
 - Rehabilitation of all access roads not required in the operational phase.

2.4.3. Worker's camp

During line construction of Arimba substation, 60kV distribution line and 60kV underground distribution line, worker's camp will be used for East Lubango substation and 220kV transmission line in Lubango area. Selection of the laydown area will be done in consultation with RNT's and ENDE's teams. The temporary construction worker's camp and laydown area will be rehabilitated once construction is completed. The worker camp is expected to include a site office, consisting of the following prefabricated units:

- Accommodation (if located far from settlement), consisting of prefabricated units;
- Eating and ablution facilities;
- Laydown area for infrastructure;
- Concrete mixing plant;
- Storage facilities for materials, equipment or waste;
- Vehicle/equipment parking area;
- Power supply (generator);
- Fuel storage containers for generators and vehicles;
- Water supply (borehole, water treatment plant, or a water tank);
- Security fencing; and
- Mobile toilets and/or French drains for treated sewage disposal.

As the project is in Feasibility Study Stage, the materials and resources that are likely to be used or generated on the construction site is not known at this stage of the SES report.

2.4.4. Tower Structure Options

Various types of tower structures can be used, depending on the landscape, engineering and the biophysical environment and areas topography. The final towers sizes and positions will only be determined once the project has finished the Feasibility Study, once negotiations between landowners

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

and ENDE, have been finalised, and after detailed geotechnical assessments and a pre-construction environmental and social walk-through has been completed. The final towers positions will take into consideration any sensitive areas identified by the SES specialists and during the walkthrough before construction.

Towers will be selected and installed in accordance with the latest industry standards, and according to JICA and ENDE’s technical requirements at the time of construction, within the parameters of this assessment. Tower will vary between 24 m and 25 m in height and the distance between each tower will be between 300 m, depending on terrain. A ACSR Gannet or AAAC Yew conductor is proposed for ENDE. The footprint of each tower foundation will be 49 – 64 square meters and foundations may be up to a maximum depth of 5 m. Foundations will occupy small portions of the right-of-way footprint, and the remainder of the footprint will remain open. The foundation types and depths vary, based on the tower, type of soil, and type of terrain (rock). A combination of the following family of tower structures will be used in Angola (see **Figure 2-6**).

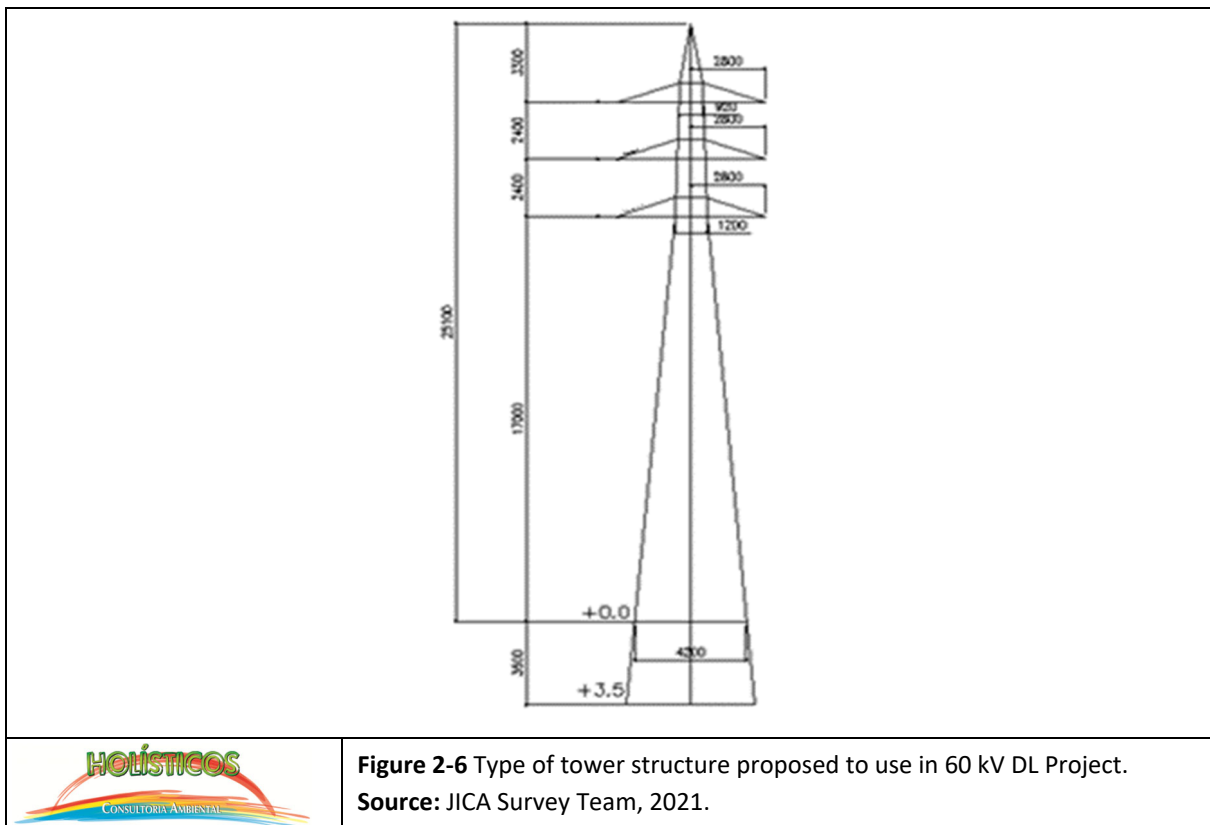


Figure 2-6 Type of tower structure proposed to use in 60 kV DL Project.
Source: JICA Survey Team, 2021.

2.4.5. Conductors

Conductor selection and optimisation normally involves the consideration of a number of factors and criteria to minimise losses and corona. The criteria include the corona inception gradient, radio interference limits, audible noise and surface gradient. Viable options are then considered in a financial analysis to determine the capital cost and associated losses per annum. The results are then ranked to

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

determine the optimised conductor size. Discussions between ENDE, JICA and TEPSCO, will indicate the best selection of conductors for the project.

2.5. East Lubango and Arimba Substations Description

The 220/60 kV East Lubango substation will be built, as part of another project called Environmental and Social Impact Assessment Report for the 220 kV Transmission Line Project between Lubango and Moçâmedes, Huíla and Namibe Provinces, owned by the National Electricity Transportation Network (RNT).

The 60/15 kV Arimba Substation in an area of approximately 4,324 m². **Figure 2-7** shows the layout of Arimba Substation and additional information on operation and future connections.

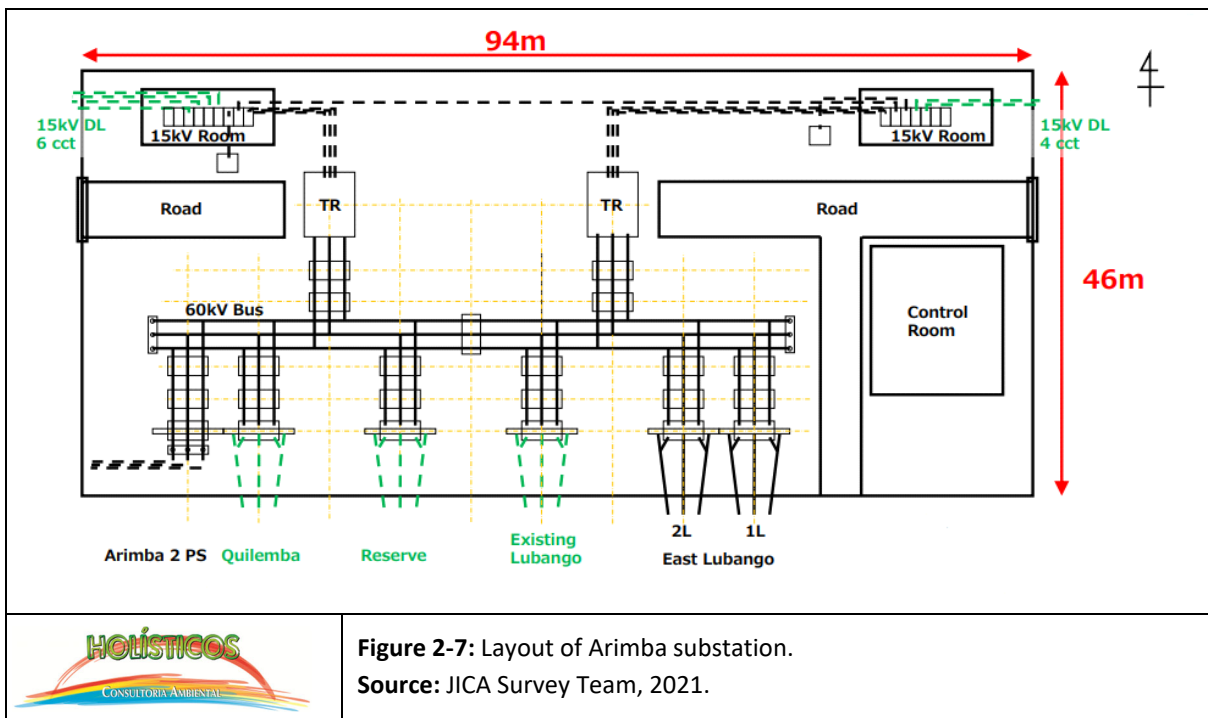


Figure 2-7: Layout of Arimba substation.
Source: JICA Survey Team, 2021.

2.6. Water

During the construction stage, the Project Manager will require potable water, for the construction workers. Water will also be required for the construction of the foundations for the towers and the substations construction as well as for other any constructions activities. Water will be sourced from contracted water trucks approved by the local authorities and provided as bottled drinking water for the staff. Daily water consumption is expected in the order of 24.13 m³ (6,10 × 18,03) see **Table 2-2**. During the development of the Project, electricity consumption will be ensured by generator group.

At least one generator is expected to be installed at worker camp. In the future, the substations will be self-sustaining.

Table 2-2: Daily water consumption.

Consumption	Distribution Line			Arimba Substation				Worker Camp
	Concrete	Access road compaction works	Worker Camp	Concrete	Civil	Structures	Access road compaction works	
Daily consumption (m ³ /day)	1.60	1.00	3.50	4.53	-	-	10.00	3.50
Total consumption (m ³)	58	30	560	1.360	800	560	1.000	1.750
Duration (days)	36	30	160	300	-	-	100	500
Total consumption (m ³ /day)	6.10							18.03

Source: JICA Survey Team, 2022.

2.7. Waste Management

All municipal and similar waste, industrial, electrical and other expected in the worker's camp will be packed in specific containers for the treatment or recycling of the same, these containers will be installed in strategically defined and correctly signposted places. Annex 2 presents the Waste Management Plan (WMP) prepared in compliance with Presidential Decree No. 190/12 of August 24th on the Waste Management Regulation. In this way, all waste resulting from the construction activities of electricity DL such as waste from chemical containers, packaging, cardboard, paper, cardboard, labels, wood pallets, electrical equipment and damaged glass, etc., will be required to be recycled or reused (when or whenever applicable). The municipality of Lubango does not have sufficient infrastructure for the collection of effluents. The municipal administrative area where the proposed DL does not have essential infrastructure, including the collection network of domestic wastewater and rainwater. Taking into account the nature of the Project, large quantities of water are not expected to be produced on the different work fronts. The effluents produced in the sanitary facilities of the workers camp will be correctly routed in a PVC biological septic tank sized according to the production of effluents expected in the Project.

When they reach the limit, they will be removed by sanitation company based in Huíla province, previously authorized for the exercise of activity at the level of the region.

2.8. Work Schedule

The whole project (including substation, towers, and distribution line, etc.) will be constructed within approximately 11 months. Table 2-4 provides a preliminary schedule of the construction of the major project components. The Project is expected to have a lifespan of at least 40 years, in the operation phase a 24 m-wide right-of-way will be constituted of along the line, where the land use will be conditioned. A buffer area will be maintained, in which there may be no buildings (schools, houses and hospitals) or large trees, periodically requiring cutting or pruning activities and maintaining access roads to the towers for maintenance purposes.

Table 2-3: Preliminary project schedule.

Activity	Duration
East Lubango Substation (RNT Project)	24 months
60 kV Distribution line	11 months
Arimba substation	11 months

Source: JICA Survey Team, 2022.

2.9. Workforce and Investment Budget

A mixture of unskilled temporary employees, semi-skilled and highly-skilled employees will be required for Project implementation. The unskilled labourers are generally trained by the contractors and sourced from local communities. Skilled staff will be accommodated in rented accommodation in nearby communities or accommodated within a temporary worker’s camp, depending on the distance to the construction site.

The total number of people in the workforce will be approximately 20 persons on average and 40 persons at maximum for 60 kV DL, and approximately 40 persons on average and 80 persons at maximum for the substation. The installation of the 60 kV DL will be conducted by an international contractor under a contract with ENDE, which will provide the necessary specialized equipment and trained personnel to complete the work. Local workers may be hired to assist in transportation, line cleaning, placement/recovery of receivers, assistance in cleaning and restoring the lines. ENDE staffs may also have direct participation in the Project management.

2.10. Operation and Maintenance Phase

The operational phase refers to the operation of the proposed DL distribution lines, 60/15 kV Arimba substation, and associated infrastructure which will be maintained periodically according to the specifications of the ENDE company. The following activities will be required during the anticipated operational lifespan of 40 years:

- General functioning of the DL (physical presence and functional characteristics);
- Periodic inspections, monitoring, and maintenance of the line, entailing the verification of the state of the conductors and structures (and replacement of components, if damaged), assessment of the compliance of the safety distances between the vegetation and the conductors, and environmental and social monitoring impacts;
- Vegetation management along the right-of-way e.g., cutting and pruning of trees, selective herbicide application, and bush clearing;
- Management of waste production associated with the periodic maintenance actions (limited to towers footprints and substation interiors); and
- Periodic maintenance activities at the substations, which include cleaning insulators, checking circuits, testing batteries, replacing transformer oils, etc.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

2.11. Alternative Locations

This section describes the analysis of technically and financially feasible alternatives considered in the development of the Project and provides documentation of the rationale for selecting a particular option. The purpose of the alternatives analysis is to identify feasible alternatives that could improve the sustainability of the Project’s design, implementation and operation.

As part of the design process, ENDE and TEPSCO in 2021 investigated various options to minimise the impact on the public and private infrastructure and the environment. The project's alternatives were explored to ensure that development will be sustainable in the context of socio-economic (employment, health, etc.) and physical (topography, landscape, etc.) needs of the Project area and surroundings. Several alternative routes were explored given the presence of important elements of sites such as the school buildings (Instituto Superior Politécnico da Huíla), rural residential areas. Considering that the potential positive impacts resulting from the implementation of the project will more effectively enhance the public electricity network in Lubango, the option of not implementing the Project is not considered as a better alternative to the proposed Project.

However, three alternatives for the route of the DL have been identified in the region. After several visits along the route of the two options (see **Table 2-5** for comparison of these routes), the green route was chosen because it crosses less physical structures, infrastructure and areas for cultivation or livestock. In some part, the chosen 60 kV DL route (green line) will be part of the one proposed yellow routes as shown in **Figure 2-8**.

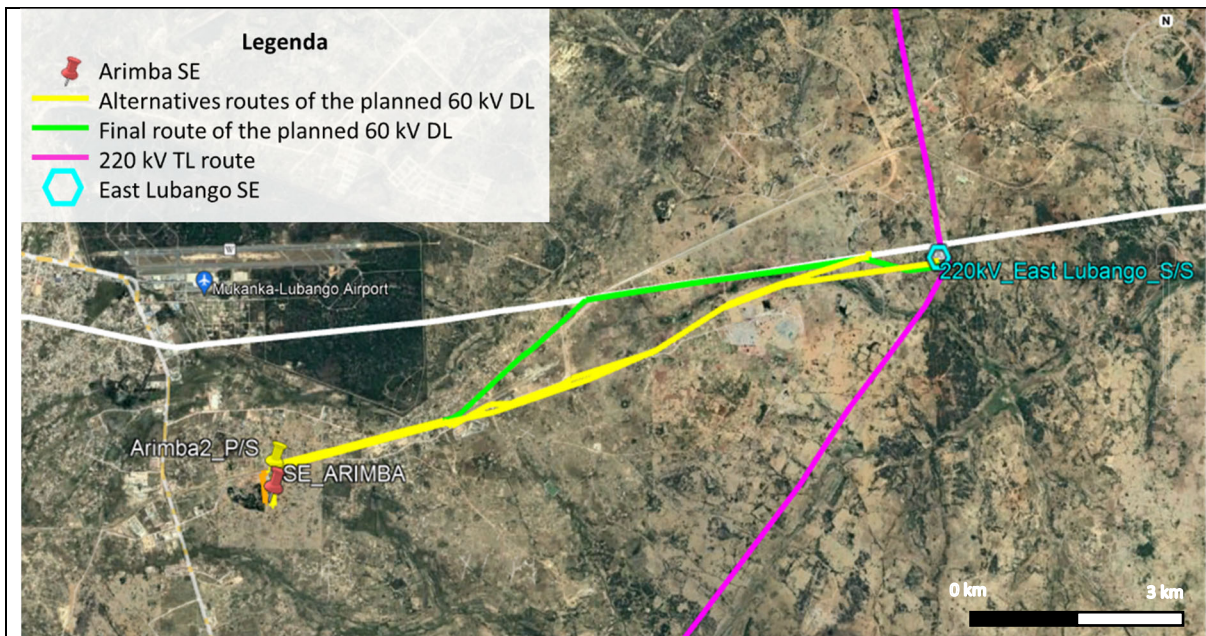


Figure 2-8: Project's alternatives routes mapped.
Source: JICA Survey Team, 2022.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

A comparison of the impact of not implementing the project ('without project') is shown in **Table 2-4**. In the case of 'without project', the construction work itself will not take place, so there will be no impact during construction, and the negative impacts foreseen from the implementation of the project will only be avoided. On the other hand, the negative impacts of 'no project' are significant, as the supply and capacity of electricity will remain as it is, and there are concerns about negative impacts on the quality of social infrastructure and social services in the Lubango area, and on the local economy and quality of life, including employment and business. In addition, there is no advantage of 'no project' as it is expected that mitigation measures can be considered for the negative impacts foreseen by the implementation of the project. There is no advantage of 'without project' as the negative effect of 'without project' are significant and the negative effects of 'project implementation' can be mitigated.

Table 2-4: Comparison of impacts without project implementation.

Aspect	The positive effect of 'without project'	The negative effect of 'without project'
Electricity demand, stable supply of electricity	None.	<ul style="list-style-type: none"> - Delays in the implementation of the distribution plan in the Lubango area will result in the overloading of the distribution lines. - Delays in meeting increased electricity demand in the Lubango area, especially the southern area.
Physical environment	<ul style="list-style-type: none"> - No impacts of soil pollution, air pollution, noise/vibration, or waste generation will occur as a result of the construction and operation. 	<ul style="list-style-type: none"> - It is easier to minimise environmental impacts in this area due to the existing 150 kV transmission line and existing roads, environmental pollution may increase if the project is implemented in other areas.
Natural (physical) environment	<ul style="list-style-type: none"> - There is no need for tree felling and land clearance due to power line ROW and access road construction, etc., and no habitat fragmentation or loss of the ecosystem occurs. - No habitat loss, bird strikes, or other impacts associated with the operation will occur. 	<ul style="list-style-type: none"> - While it is easier to minimise environmental impacts in this area due to the existing 150 kV transmission lines and existing roads, environmental impacts may increase if the project is implemented in other areas.
Social and economic	<ul style="list-style-type: none"> - No land acquisition or resettlement occurs. - The adverse impact on local communities caused by access restrictions, traffic blockades and the establishment of workers' camps resulting from the laying of transmission lines and the construction of substation facilities does not arise the adverse impact on local communities. 	<ul style="list-style-type: none"> - No contribution to local employment, such as employment opportunities in the project area, is obtained. - Delays in addressing electricity supply may further delay the future development of the economy and quality of life in the region concerned.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Source: JICA Survey Team, 2022.

Table 2-5: Alternative analysis for the 60 kV distribution line route.

Category	Item	Plan A	Plan B
Route overview	Origin	East Lubango substation	East Lubango substation
	Destination	Arimba substation	Arimba substation
	Distance	10.0 km	10.3 km
	Route	It passes mainly along a road linking the East Lubango and Arimba substations in an almost straight line.	Approximately 4 km parallel to the existing 150 kV transmission line just west of the East Lubango substation, then 5 km parallel to the railway to the east of the Arimba power station to the Arimba substation.
Location	Land use	Almost flat savannah; few trees, some settlements but sparse housing and limited cultivation land. There is a quarry and a primary school near the East Lubango substation. Social infrastructure facilities include roads, railways, and an airport.	Almost the same as Plan B.
	Competing facilities, structures, etc.	No problem for railway crossings and not subject to airport altitude restrictions	Almost the same as Plan A.
	Suitability for local conditions	The region has a stable electricity supply and high expectations for future development, and the existing 150 kV transmission line is already in place, making it highly compatible with regional conditions.	Slightly more suitable than Plan A in terms of ease of construction, maintenance, and environmental and social considerations by using the ROW of existing 150 kV transmission lines.
Technology	Construction costs	Although the extension distance is shorter than Plan B, the construction cost is slightly higher than Plan B due to the many bends.	Although the extension distance is slightly longer than Plan A, the construction cost is slightly lower than Plan A due to fewer bends.
	Workability	Although it is along a road, it cannot be occupied for construction, making it slightly less constructible than Plan B.	Slightly easier to install than Plan A, as the ROW of existing 150 kV transmission lines can be used.
	Maintainability	Due to the proximity to the quarry, dust impacts are foreseen. In addition, the maintenance access road needs to be improved more than in Plan B.	4 km of the 10 km distribution line route will be built parallel to the existing 150 kV transmission line, making it slightly more maintainable than Plan A.
Design aspect	Design issues	None in particular.	None in particular.
Operational aspect	Institutional development,	Existing methods of operation can be addressed.	Existing methods of operation can be addressed.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Category	Item	Plan A	Plan B
	training, and monitoring required		
Environmental and social considerations	Environmental impact	<ul style="list-style-type: none"> - The first half of the route from East Lubango is slightly more affected than Plan B by air pollution, noise and vibration during construction as it passes through scattered dwellings and cultivated land. - The ecological impact during construction is expected to be minor, but the potential for bird strikes on transmission lines is envisaged. 	<ul style="list-style-type: none"> - Due to the shorter section along the road compared to Plan A and the longer parallel section with the railway and the existing 150 kV transmission line, air pollution, noise, and vibration impacts are slightly lower than in Plan A. - The impact on ecosystems is considered to be similar to that of Plan A. [Slightly dominant].
	Social Impact*.	<ul style="list-style-type: none"> - A certain degree of impact on the living environment and economic activities during the construction period is expected due to the proximity to settlements and quarries in the vicinity of the East Lubango substation. - Social impacts will be reduced as part of the route is along an existing road. 	<ul style="list-style-type: none"> - The reduction of social impact due to the existence of the utilized section of the existing 150 kV ROW is slightly higher than in Plan A. [Slightly dominant].
	Alternative and rationale for selection	>>Not selected: Although the distance is shorter than Plan B, Plan B has an advantage in terms of construction costs, ease of construction, environmental impact, and social impact due to the longer roadside.	>>Select Although the distance is slightly longer than Plan A, the longer parallel to the existing 150 kV transmission line has advantages over Plan A in terms of construction costs, workability, maintainability, environmental impact, and social impact.

Source: JICA Survey Team, 2022.

CHAPTER 3

INSTITUTIONAL AND LEGAL FRAMEWORK

3. INSTITUTIONAL AND LEGAL FRAMEWORK

This chapter describes the institutional framework (organic statutes of the Angolan ministerial departments and provincial government) and national legislation (laws, regulations, policies, and applicable decrees) relevant to the Project activities in Huíla province. It also presents relevant international multilateral environmental agreements to which Angola is party and are relevant for the energy distribution line Project.

3.1. Institutional Framework

Article 39^o (of February 5th, 2010) of the Constitution of the Republic of Angola establishes environmental law that rules the State institutions that enforce environmental protection. This article states that everyone has the right to live in a healthy, unpolluted environment and the duty to defend and preserve it. The State takes necessary measures to ensure the environmental law is upheld thus protecting flora and fauna species, ecological balance and the environment within the national territory. It also regulates the location of economic activity and the use of all-natural resources in the context of sustainable development and respecting the rights of future generations.

Considering the nature of the Project, the above responsibilities and environmental legislation regulations are the responsibility of the Ministry of Energy and Water, Ministry of Culture, Tourism and Environment, Ministry of Transport and the Provincial Government of Huíla.

3.1.1. Ministry of Energy and Water

This Ministry was restructured under Presidential Decree No. 223/20 of August 28th. It is the Executive ministerial department that proposes, formulates, manages, conducts, executes, and controls the Executive policy in the domains of energy, water and sanitation. The main attributions of the Ministry of Energy and Water are as follows:

- Propose and promote policy execution in the energy and water sectors;
- Establish strategies, promote and coordinate the profit and rational utilization of energy and water resources, assuring sustainable development;
- License, supervise, and inspect hydraulic profits, and water and sanitation supply system licensing; and
- Collaborate with Local State Administration bodies in the elaboration and implementation of electrification programmes, water supply and support the development of rural, urban and pre urban zones.

These attributions are executed by its central executive services, namely the National Directorate of Electric Energy; Local and Rural Electrification; and Renewable Energy and Water. The National Directorate of Electric Energy is the direct executive service of the Ministry of Energy and Water (MINEA), whose aim is the planning, study, conception, and accompaniment of policy execution relating to the production, transportation, distribution, and use of electric energy.

The Ministry of Energy and Water (MINEA) has undergone major restructuring in the energy sector in Angola through the promulgation and coming into force of Presidential Decree No. 305/14 of November 20th, 2014. This decree, in alignment with the macro Power Sector Transformation Program (PSTP), resulted in the creation of different organizational structures within the MINEA to oversee various aspects of the power sector in Angola, namely: production (e.g., operation of power generating facilities), transportation (e.g., power system management, market operation, and management of the transmission network) and electrical distribution. **Figure 3-1** below captures key institutions associated with energy management in Angola and the subsequent pages describe the roles of such institutions and list applicable national regulation and relevant international guidelines.

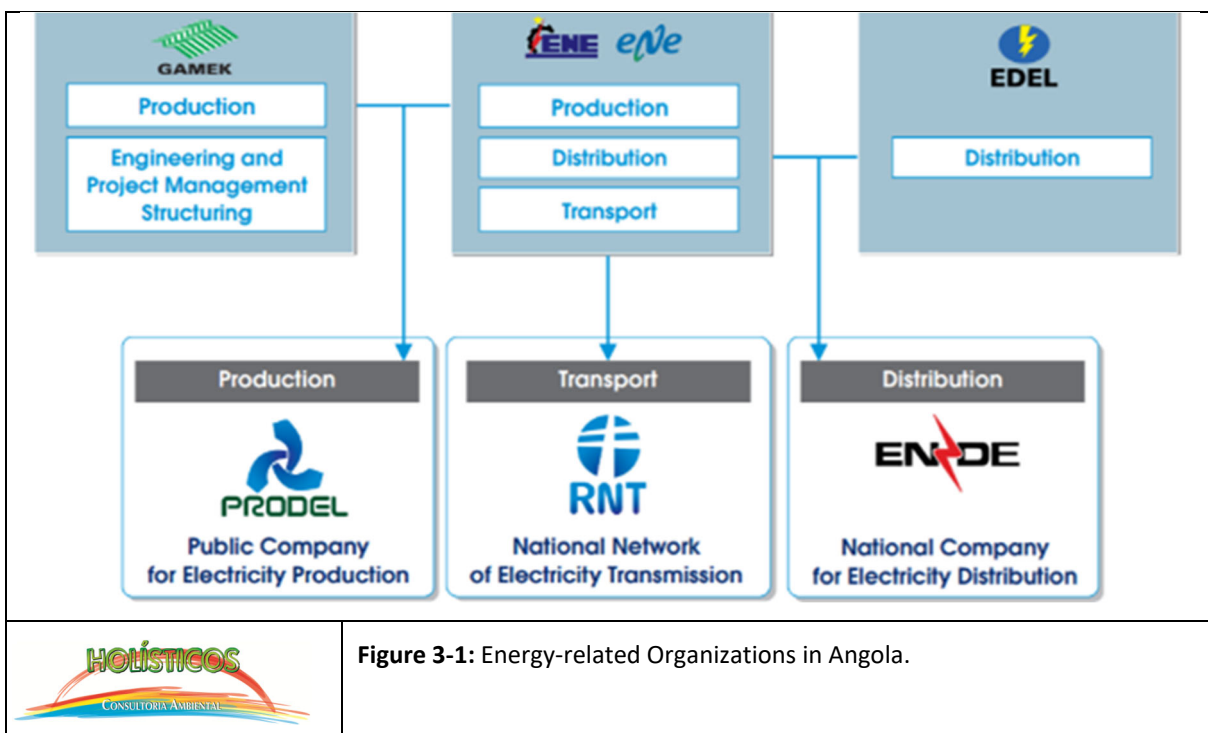


Figure 3-1: Energy-related Organizations in Angola.

PRODEL is a strategic company legally recognized with administrative, financial, patrimonial and management autonomy, governed by the Organic Statute approved by the Presidential Decree N. 305/14 of 20th November, through complementary norms of execution, together with the legislation applicable to public companies and, in terms of what is not clearly regulated, by the norms of the Commercial Right (*Direito Comercial*) and further norms of private rights in force. The company’s main objective is the production of electric energy as per the scope of the Public Electric System (PES) and in accordance with the terms and conditions of the respective concessions or licenses. PRODEL, core business includes the production of hydroelectric energy, thermal, hybrid and renewable energy. Within the organization structure, there is a specialized department for Quality, Health, Safety and Environment (QHSE).

The National Electricity Transportation Network (RNT) is a public company with the responsibility of the management and planning of all the transmission network of the country, integrating all the Very

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

High Voltage Transmission assets of former ENE. The main objective of the RNT is to transport electric energy through the exploration of the National Electricity Transportation Network (NETN). As per the General Electricity Law concession and its regulations, NETN comprises the national very high-tension system, interconnection net, national dispatch installations, as well as the goods and rights connected in parallel with the market operator function (a single buyer). The Transportation Tension levels under responsibility of RNT are 400 kV, 220 kV, 150 kV, 132 kV and 110 kV.

The National Company for Electricity Distribution (ENDE), is a public company with the responsibility of distributing electricity, integrating all the activities and assets of former EDEL and the distribution assets of former ENE. The main responsibility of ENDE is to distribute and commercialize electricity at the national level, through the exploitation of distribution network infrastructure (HT, MT, LT) in High, Medium and Low Voltages, under public service regime, under the terms of the General Electricity Law and related Regulations.

Besides PRODEL, RNT and ENDE, *Gabinete de Aproveitamento do Médio Kwanza* (GAMEK) is other public entities with relevant roles in terms of power related projects. GAMEK is under the Ministry of Water and Energy, and it has legal, administrative, and financial autonomy; being driven by its Organic Statute approved by the Joint Dispatch No. 14/86 of 17 March 1986.

GAMEK is currently the institution responsible for the management of the Middle Kwanza Basin, and for all energy projects under construction including thermal and hybrid plants, hydropower dams, and transmission line projects. Among other development projects, PRODEL is currently also responsible for management of the Capanda Dam, which is a hydroelectric dam located within the Kwanza River basin in the Municipality of Cacuso, in the Province of Malanje. Capanda dam has a total electric generating capacity of 960 MW.

3.1.2. Ministry of Culture, Tourism and Environment

The Ministry of Culture, Tourism and Environment (MCTA), restructured under Presidential Decree No. 162/20 of June 8th, is the institution responsible for formulating, conducting, monitoring, evaluating and enforcing policies in the field of culture, tourism and the environment. This includes the implementation of strategic programmes and projects to promote culture, tourism development and environmental management. In the environmental sector, MCTA has among others, the following competencies:

- Promote the public dissemination of information about the environment in the country;
- Promote environmental training and education, dialogue and citizen participation to better understand the phenomena of environmental balance;
- Coordinate national actions to respond to global environmental problems by implementing the recommendations of international conventions and agreements;
- Propose the creation and classification of environmental conservation areas of national and regional scope;

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Promote the management of conservation areas, including national parks, nature reserves and biosphere and landscape protection and preservation.

These duties are carried out by direct executive bodies and services, namely: The National Directorate for Environment and Climate Action, and the National Directorate for Prevention and Environmental Impact Assessment. The latter, responsible for the implementation of Presidential Decree No. 117/20 of April 22nd on the Environmental Impact Assessment Regulation and Environmental Licensing Procedure. MCTA is also responsible for the registration of companies authorized to carry out Simplified Environmental Study, as well as for providing or approving the specific Terms of Reference for Environmental and Social Impact Studies.

In order to fulfil the Terms of Reference for the development of Environmental Impact Studies (Executive Decree No. 92/12 of March 1st), the project was registered with the Ministry of Culture, Tourism and Environment on January 20th 2022. **Figure 3-2** is a graphic illustration of the Environmental Impact Assessment (EIA) process for Simplified Environmental Study (SES) according to the environmental legislation and all other legislation in place in the Republic of Angola.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

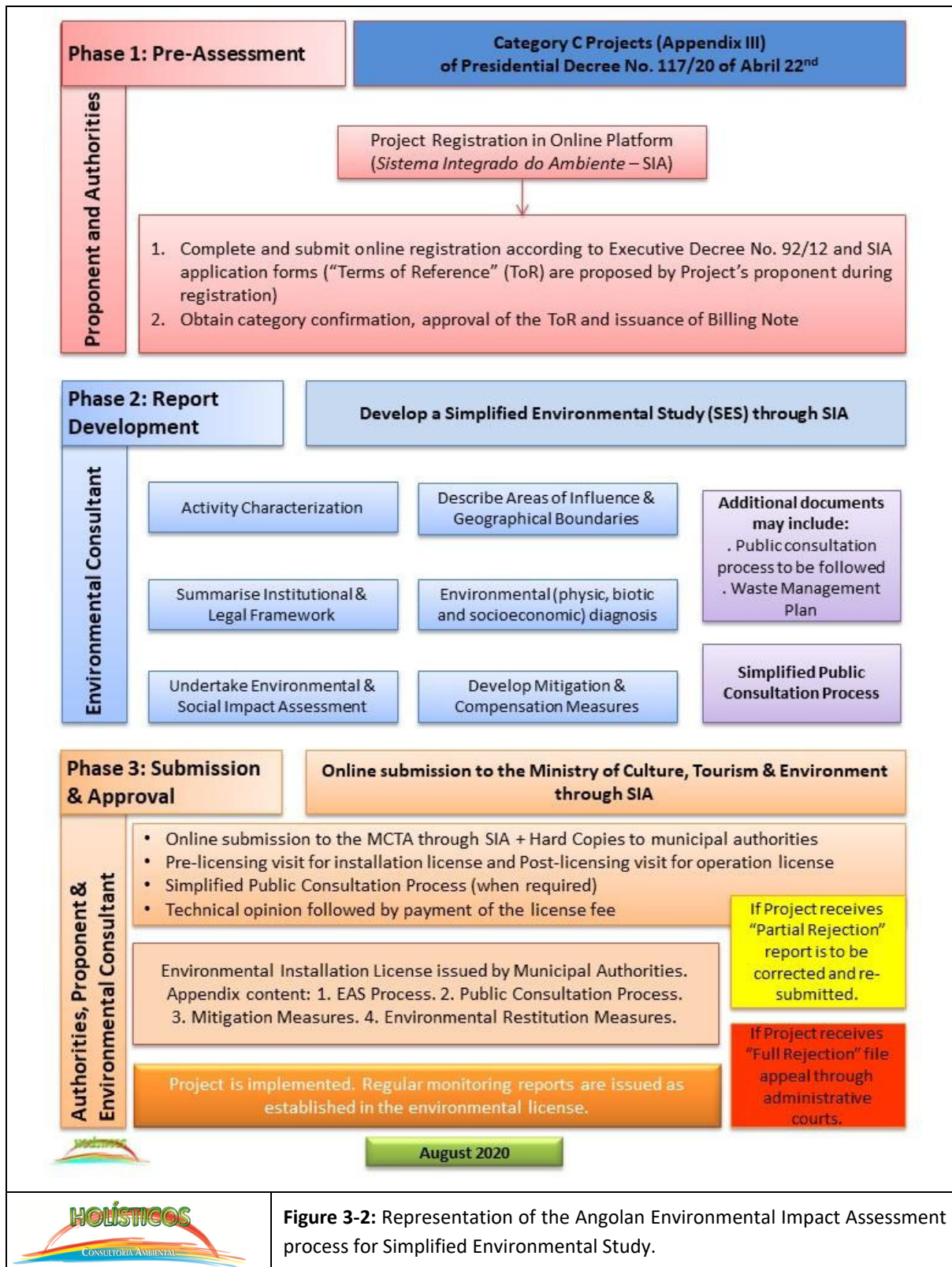


Figure 3-2: Representation of the Angolan Environmental Impact Assessment process for Simplified Environmental Study.

Source: Presidential Decree No. 117/20 of April 22nd.

3.1.3. Ministry of Transport

The Ministry of Transport was restructured under Presidential Decree No. 233/20 of September 14th, 2020. The Ministry of Transport (MINTRANS) has the mission to propose the formulation, conduction, execution and control of the Executive's Policy in the field of transport.

These attributions are executed by its institutions of superintendents that have their own structures, namely the Institute of Civil Aviation (INAVIC); Institute Maritime and Port of Angola; National Institute of Road Transport; National Institute of Railway of Angola; National Porters Council and Institute of Hydrology and Maritime signalling.

Since the distribution line proposed route will be in the manoeuvre zone of one airport (Mukanka International Airport) the Institute of Civil Aviation (Presidential Decree No. 2/15 of January 2th) it is a public institute with administrative, financial and patrimonial, endowed with legal personality and management autonomy, designed to support the aeronautical authority in the performance of its coordination, guidance, control, inspection, licensing and regulation of all activities related to the Sector of Civil Aviation developed in Angola or in the airspace under its jurisdiction.

3.1.4. Ministry of Agriculture and Fisheries

The Ministry of Agriculture and Fisheries, abbreviated as MINAGRIP, was restructured under Presidential Decree No. 177/20 of June 23rd, 2020.

The Ministry of Agriculture and Fisheries is the ministerial department of the Angolan Executive, which is responsible for propose the formulation, execution, conduction and control of the Executive's policies in the fields of agriculture, livestock, forests, food security and management, management and planning of aquatic biological resources, sustainable fishing and aquaculture activities, salt production, research, experimentation and technological innovation in the area of the sea, prospecting, use, exploitation and enhancement of aquatic resources, and an economy of the sustainable sea, with a view to sustainable development.

These attributions are executed by its central executive services. In terms of energy related projects (transmission line), the Agriculture Land Management Office, the National Agricultural and Livestock Directorate, and the Forestry Development Institute are particularly important.

The Agriculture Land Management Office is responsible for the management of land use regarding agriculture, livestock and forestry. Consequently, it concedes use titles, technical reports for agricultural, commercial, and industrial businesses susceptible to influence national development, and implements several activities related to land structuring.

The National Agriculture and Livestock Directorate proposes policies and development strategies on agriculture and rural engineering, as well as measures to protect and rehabilitate degraded agricultural

land. And the Forestry Development Institute ensures promotion, coordination, and execution of forestry, fauna, rural, and technology transfer policies.

3.1.5. Government of Huíla Province

It is the responsibility of the Huíla Provincial Government to promote the orientation of socioeconomic development based on the principles and strategic options defined by the Central Government, as well as to assure that public services are rendered at respective geographical areas. In the field of the environment and in accordance with the Law on the Organization and Functioning of State Administration Bodies, the following powers are attributed to them: promotion measures aimed at the defense and preservation of the environment; promote and encourage local business development initiatives; promote sanitation and the environment, as well as the construction of rural and urban equipment, and promote environmental education campaigns.

In Huíla province, any activity implemented at a local level that is related to environmental issues is the responsibility of the Environment, Waste Management and Community Services Provincial Office (Executive Decree No. 46/18 of April 12th).

3.2. National Legislation

The necessity for environmental protection and the requirement for achieving sustainable development is founded on the right of all citizens to live in an unpolluted, healthy environment, as well as the duty to defend and preserve it, as defined in Article 39/1 of the Constitution. The same article notes that the State must adopt the necessary measures to protect the environment and the flora and fauna species throughout the national territory, maintain ecological balance, correct location of economic activities, and the rational utilization and exploitation of all-natural resources, within the framework of sustainable development and with respect to the rights of future generations and the preservation of different species.

It is in this context and taking into account the need to prevent and mitigate potential adverse social and environmental impacts of projects involving the construction of infrastructures, exploitation of natural resources, and the consequent eviction of effluents, that the Government of Angola adopted the Environmental Framework Law (Law No. 5/98 of June 19th). In absence of national legislation regarding specific aspects, or if it is incomplete, particularly in the area of technical specifications, the project promoters must implement international instruments containing good practices in relevant fields, or the appropriate standards in force in other countries.

A summary of legislation relevant to the project activities is presented in **Table 3-1**.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Table 3-1: Summary of National Legislation Applicable to the Project.

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
Environmental Legislation			
1	Environmental Framework Law	Law No. 5/98 of June 19 th .	Establishes the general duty regarding environmental protection and the sustainable use of natural resources, as well as to contribute to the quality of life (Articles 3 rd /1 and 25 th , referring expressly to citizens and businesses in the public and private sectors).
2	Environmental Licensing Rates	Executive Decree No. 96/09 of October 6 th . and Executive Decree No. 130/09.	Defines fee amounts to be charged for the issuance and renewal of environmental installation and operation licences, registration of consultants, and the costs of the Environmental Impact Assessment, including the public consultation process.
3	National Policy on Forests, Wild Fauna and Conservation Areas	Resolution No. 01/10 of 14 th January.	Promote the sector's contribution to the sustainable development of the country, through the preservation, conservation, development and wise use of forests, wild fauna and conservation areas, for the benefit of present and future generations.
4	Regulation on Responsibility for Environmental Damage	Presidential Decree No. 194/11 of July 7 th .	This law Decree establishes the responsibility regarding the risk and degradation of the environment based on the "polluter pays" principle in order to prevent and remedy environmental damage.
5	Regulation on Public Consultation	Executive Decree No. 87/12 of February 24 th .	This defines "public consultation" as the "procedure within the framework of public participation that aims to collect opinions and suggestions from stakeholders on projects subject to an Environmental Impact Assessment."
6	Term of Reference for the Elaboration of Environmental Impact Studies	Executive Decree No. 92/12 of March 1 st .	Establishes the guidelines for the preparation of studies subject to an Environmental Impact Assessment, including laying out the minimum content that must be contained within the Environmental and Social Impact Assessment report.
7	Regulation of Waste Management	Presidential Decree No. 190/12 of August 24 th .	Establishes that all public and private entities that produce waste or carry out activities related to waste management shall prepare a Waste Management Plan (WMP) prior to the commencement of their activity, containing at least all information set out in Appendix I and II, respectively.
8	Executive Decree Regarding Construction	Executive Decree No. 17/13 of January 22 nd .	Establishes legal regulations relating to waste management resulting from the construction

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
	and Demolition Waste Management		or demolition of buildings or landslides, briefly referred to as construction and demolition wastes, including its prevention and reuse and operations of collection, transport, storage, sorting, treatment, recovery, and disposal.
9	Criminalisation Regarding Infringements and Underlying Money Laundering	Law No. 3/14 of February 10 th .	Aims to regulate a range of conduct, aiming to exercise the criminal laws of Angola to regarding the protection of certain fundamental legal rights, including crimes against the environment.
10	Forest and Wildlife Law	Law No. 6/17 of January 24 th .	Establishes the norms that aim to guarantee the conservation and sustainable use of the forests and the fauna within the national territory.
11	Forest Regulation	Presidential Decree No. 171/18 of July 23 rd .	Provides the regulation for sustainable use of forestry resources and its ecosystems and establishes norms and procedures for its conservation and sustainable use.
12	National Biodiversity Strategy and Action Plan	Presidential Decree No. 26/20 of February 6 th .	The National Strategy and the Biodiversity Action Plan aims to ensure the conservation and sustainable use of biodiversity components, taking into account the fair and equitable sharing of the benefits from the use of resources conservation, preservation, protection and restoration of biodiversity in Angola.
13	Environmental Impact Assessment Regulation and Environmental Licensing Procedure	Presidential Decree No. 117/20 of April 22 nd	Approval of the General Regulation for Environmental Impact Assessment and the Environmental Licensing Procedure, establishing its rules and procedures that, by their nature, location or dimension, are likely to cause significant environmental and social impact, applicable to all public or private activities that directly or indirectly can influence the environmental components and regulates Impact Assessment, Environmental Licensing and Inspection, Fines and Fees and repeal of Decree No. 51/04 of July 23 rd on Environmental Impact Assessment, and Decree No. 59/07 of July 13 th - on Environmental Licensing.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
14	Taxes for Emission and Renewal of Environmental Licenses	Presidential Decree No. 83/22 of April 12 th	Establishes the fees to be charged for the issuance and renewal of environmental licenses for the Environmental Impact Assessment, as well as the registration and renewal of environmental consulting companies.
Health and Safety Legislation			
15	General Regulation of Occupational Health and Safety Services	Executive Decree No. 6/96 of February 2 nd .	Establishes the principles that aim to promote safety, hygiene and health at work in companies, commercial and industrial establishments, and cooperatives.
16	General Regulation of Safety and Health at Work Signalling	Executive Decree No. 128/04 of November 23 rd .	Lays down minimum requirements for placement and use of occupational safety and health signs at work and is applicable to public companies, joint ventures, cooperative and private enterprises.
17	Legal System for Work-Related Accidents and Occupational Diseases	Decree No. 53/05 of August 15 th .	Approval of the legal regime of work-related accidents and occupational diseases, considering as such events that occur during the course of employment within a company or institution that cause the employee injury or bodily harm resulting in inability, partial or total, temporary or permanent to work or resulting in death.
18	General Labour Law	Law No. 7/15 of June 15 th .	Stipulates that employers have a responsibility to ensure the quality of the work environment, including the adoption of "appropriate measures of safety and health at work".
Energy Sector Legislation			
19	Regulation on Substation Safety	Decree No. 42895, dated March 31 st of 1960.	Approves the safety standards for substations and transformer stations in order to establish the technical conditions to be met during the operation of substations and jobs for the protection of people and the safeguarding of collective interests.
20	Regulation of the Protection of High Voltage Transmission	Decree No. 46.847 dated 1966.	Regulates safety and security of high voltage transmission lines. Restrictions include: i) houses and structures allowed as long as distance between transmission line axis and the top of the structure is more than 4-5m; ii) crops and trees allowed as long as distance to the transmission line axis is more than 4 meters; and iii) Establishes a protection corridor of 50 meters wide.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
21	General Electricity Law	Law No. 14-A/96 of May 31 st .	Establishes the general principles of the legal regime relating to activities of production, transmission, distribution and use of electrical energy.
22	Regulation of Electric Power Production	Decree No. 47/01 of July 20 th .	Establishes the legal regime relating to the production of electrical energy within the Public Electrical System (PES). Production outside the scope of the PES, which comprises the self-production and private supply is developed only in accordance with the rules laid down in the regulations for licensing and safety of electrical installations.
23	Regulation of Licensing of Installations of Production, Transport and Distribution of Energy	Decree No. 41/04 of July 2 nd .	Defines the principles and rules which must be observed during the licensing of Electrical Installations which are designed, built and operated for the purpose of producing, transporting or distributing electricity for public consumption and the legal and administrative provisions that regulate the establishment and operation of such facilities.
Water Sector Legislation			
24	Water Law	Law No. 6/02 of June 21 st .	Establishes the general principles of the legal systems regarding the use of water resources.
25	Regulation of Water Quality	Presidential Decree No. 261/11, of October 6 th .	Establishes water quality standards and criteria for the purpose of protecting the aquatic environment and improving the quality of water on the basis of their main uses. Applies to inland waters, both superficial and groundwater, as well as the water for aquaculture, livestock, agricultural irrigation, and seaside resorts.
26	Regulations on the General Use of Water Resources	Presidential Decree No. 82/14 of April 21 st .	Defines the regime for the general use of water resources, including the mechanisms for planning, management and economic and financial retribution. Establishes the fees and tariffs and the method of payment and collection thereof, as well as the regime for occupation, expropriation and easement and establishes the respective system of inspection and sanctions, being applicable to surface and underground waters (e.g., rivers, watercourses, etc.).
27	Regulation of Public Water Supply and Sanitation of Wastewater	Presidential Decree No. 83/14 of April 22 nd .	Defines the rules regulating public water supply and wastewater sanitation activities.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
Spatial Planning Sector Legislation			
28	Spatial Planning and Urbanism Law	Law No. 3/04 of June 25 th .	This law has as its object the biophysical space, consisting of all urban soils and rural areas, subsoil, the continental shelf and inland waters, with a view to ensure actions which result in the occupation and use of the spaces above, through the implementation of spatial and urban planning instruments.
29	Land Law	Law No. 9/04 of November 9 th .	Establishes the general bases of the legal regime of land included in the original property of the State, land rights that may be levied on them, and the general scheme of transmission, constitution, exercise and extinction of these rights.
30	General Regulation for Land Concession	Decree No. 58/07 of July 13 th .	Establishes the legal framework for the concession of free lands within Angola and does not apply for private property lands. It also indicates that where there is expropriation for public use or for temporary requisition of lands, fair and adequate indemnity to the owner and to affected holders of other property rights is always owed.
General Law			
31	Public Expropriation Law	Law No. 1/21 of January 7 th .	The Law of Expropriation for Public Utility (LEUP) establishes the principles and rules to be observed in expropriation for public utility by Organs competent bodies of Public Administration. Within the scope of the Expropriation process, several general principles must be observed, including the principles of legality, justice, proportionality, impartiality, public utility, fair and prompt compensation, respect for private property, and the land rights of local communities and the right to reverse. It is important to mention that in addition to the State, Local Authorities may benefit from expropriation, as well as any public or private legal person to whom this quality is recognized, provided that there are well-founded reasons for public utility.
32	Cultural Heritage Law	Law No. 14/05 of October 7 th .	Defines cultural heritage as all material goods and intangible assets which, by their recognised value, shall be subject to the authority and protection of the law, presenting a series of activities which are considered infringements against cultural heritage.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

#	TOPIC	LEGISLATION	DESCRIPTION & SCOPE
33	Criminalization of Offenses Underlying Money Laundering	Law No. 3/14 of February 10 th	Its purpose is to proceed with the criminalization of a set of conducts, aiming at adapting Angolan criminal legislation to the protection of certain fundamental legal assets. This law includes crimes against the environment.
34	Administrative Offences Law	Law No. 12/11 of February 16 th .	Establishes the general bases applicable to administrative offences committed by an individual or collectively by citizens or public or private collective entities.
35	Regulation on Resettlement	Presidential Decree No. 117/16 of May 30 th .	Defines the rules, procedures and criteria to be used during the process of resettlement and relocation of populations in specific situations, such as natural disasters, rehabilitation and urban redevelopment, public works and housing fires and aims to improve the social conditions of the population.
36	Regulation for the Transfer of Waste for Reuse, Recycling and its Recovery	Presidential Decree No. 265/18 of November 15 th	Establishes the rules and procedures relating to operational and administrative control over the transfer of waste for reuse, recycling and its recovery abroad. This Diploma is only applicable to non-hazardous waste destined for reuse, recycling and recovery, to be transferred abroad.

3.3. Land Acquisition Process for Distribution Line

Land concession, for the 60 kV Distribution Line and 60/15 kV Arimba Substation, in Angola is governed by two (2) processes. One is the formal land concession process documented in the land Law (Law No. 9/04 of November 9th) and General Regulation for Land Concession (Decree No. 58/07 of July 13th), which generally applies to land with private property, or surface rights (regardless of land size). The other is the informal process, which is undocumented, and applies primarily where acquisition involves parcels of land held with customary land rights or useful civil domain rights. The informal process is generally administered by the traditional authorities (Regedores, Seculos and Sobas) or the community with the support of the municipal administrations as needed.

In the context of the Project, both the formal and informal processes may apply, with the formal process more likely to apply in urban and peri urban areas, and where businesses or economic activities are affected. The rights to the land, and therefore the required process, will likely only be confirmed through topographic and asset inventory processes. The combined steps of the formal and informal processes that the Project is expected to follow for the land concession is summarized in **Table 3-2**.

The formal land concession process for the Arimba substation will start with the submission of the request by the interested party and is followed by community disclosure and consultation and the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

provisional demarcation of the land, consideration of the application and approval or rejection, followed by the definitive demarcation, after which a concession contract is usually signed and the concession title granted. The final step is the registration of the right in the land registry (Provincial Government of Huíla).

Table 3-2: Phases of the formal and informal land concession processes¹.

Items	Formal and Informal Land Concession Processes	Activities necessary
1	Application submission	<ul style="list-style-type: none"> Project informs provincial government, municipality authority and traditional authorities (Soba).
2	Consultations with interested parties and local communities.	<ul style="list-style-type: none"> Project discloses activities and land location to the Soba and community.
3	Temporary land demarcation	<ul style="list-style-type: none"> The traditional authorities (Soba) identify affected landowners and users. Survey and asset inventory. Negotiation and agreement on Compensation. Soba informs the authorities of the agreement.
4	Consideration and approval or rejection	<ul style="list-style-type: none"> Project compensates affected landowners and users.
5	Definitive demarcation	
6	Concession contract signing	
7	Concession title granted	
8	Land registration	

Compensation Process

For the 60 kV TL Project, according to the Public Expropriation Law (Law no. 1/21 21 of January 7th “immovable assets and related rights may be expropriated for public utility purposes through payment of fair compensation”. Fair compensation shall be determined based on the actual value of the expropriated property as determined by a specialized land valuator, always calculated assuming the value of “perfect property” or “perfect ownership” and including any additional related prejudice or costs. In the event that rights other than the right of “perfect ownership” are expropriated, compensation shall be determined for the prejudice and losses resulting from the deprivation of such rights.

The capital gain resulting from public works or improvements, or any other circumstance initiated by the affected person or third party after the declaration of the expropriation for public utility, shall not be taken into consideration. The declaration is always published in the government Republic Gazette. In fact, the “cut-off” date for compensation is established as soon as the parties are informed that the Project has been approved and is going forward (e.g., during final demarcation).

¹ **Note:** (*) Orange boxes correspond to the formal process as described in the land legislation and concession regulation (*Lei de Terras* n.º 9/04 and *Regulamento Geral de Concessão de Terras* n.º 58/07), whereas the green boxes present the informal process as documented during the field survey and based on input from local specialists. **Source:** Prepared by Holísticos based on Land Legislation and input from Holísticos, 2020.

In practice, compensation is paid for crops and trees and physical structures. Compensation rates for loss of agricultural crops, and trees are established by the Ministry of Agriculture and Fisheries. As for land, compensation for loss of land rights only occurs in the case that affected people have a land ownership title, either as a result of a private ownership right or surface right. In this case, compensation is paid for permanent land take; compensation for temporary loss of access is not considered in the law. Decree No. 58/07 of July 13th (General Regulation for Land Concession) also states that the expropriating entity may alternatively concede to the expropriated party a parcel of land in the same judicial situation, appropriate similar use. Compensation in cash or in kind is generally subject to negotiation and agreement between the expropriating entity and the affected party. There is a Grievance Mechanism that has been established for any issues.

Project Land Acquisition Background

The Angola Government will ensure all rights necessary, including the land space, for the 60 kV DL and the 60/15 kV Arimba substation implementation.

For the 60/15 kV Arimba substation and 60 kV DL the relevant Municipal Administrations and the Angolan Geographic and Cadastral Institute (IGCA – *Instituto Geográfico e Cadastral de Angola* – in the Huíla province) (the public institution responsible for, amongst others things, promoting the execution, maintenance and renovation of the land and cadastral registry) will issue an internal opinion at the request of Provincial Government before the granting of land-related titles, in addition to preparing a location map on the target land.

IGCA should be able to provide information (*croquis de localização*) on the project location, total area, geographic coordinates, number of registries in the Real Estate Registry Office or declaration of omission in the Registry, as well as any circumstances relevant for the identification of the target land. Upon confirming that the locations are owned by the State, the Provincial Government should, ex-officio, promote the registration of the rights in the name of ENDE before the Real Estate Registry Offices. To summarize, the process of the land transfer involves two Angolan state entities and will be effectuated from Provincial Government of Huíla to Angolan state-owned ENDE.

3.4. JICA Guidelines for Environmental and Social Considerations (2010)

Regarding Environmental and social considerations, JICA has created clear requirements, which project proponents etc., must meet. JICA provides project proponents and other project intervenient with support in order to facilitate the achievement of these requirements through the preparation and implementation of cooperation projects. JICA examines undertakings by project proponents, in accordance with the requirements, and makes adequate decisions regarding environmental and social considerations based on examination results. JICA recognizes the following seven principles to be very important:

- 1) A wide range of impacts must be addressed;
- 2) Measures for environmental and social considerations must be implemented from an early stage to a monitoring stage;

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- 3) JICA is responsible for accountability when implementing cooperation projects;
- 4) JICA asks stakeholders for their participation;
- 5) JICA discloses information;
- 6) JICA enhances organizational capacity;
- 7) JICA makes serious attempts at promptness.

JICA responsibility take the initiative to deal with the environmental and social considerations of projects, JICA provides support for and examinations of the environmental and social considerations that project proponents etc. implement in accordance with Sections 2 and 3 of the guidelines, depending on the nature of cooperation projects.

JICA classifies projects into four (4) categories according to the extent of environmental and social impacts, considering an outline of project, scale, site condition and others, as follows:

- **Category A:** Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas. An illustrative list of sensitive sectors, characteristics, and areas is provided in one of its appendixes.
- **Category B:** Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.
- **Category C:** Proposed projects are classified as Category C if they are likely to have minimal or little adverse impact on the environment and society.
- **Category FI:** Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the sub-projects cannot be specified prior to JICA's approval of funding (or project appraisal); and those sub-projects are expected to have a potential impact on the environment.

When necessary, JICA can change a category even after screening. This might occur such as when a new significant impact has come to light as a result of the cooperation project process, or in other specific situations. This project, although small in size on its own, is classified as a Category A project as part of the JICA project component together with the RNT 220 kV transmission line project.

Table 3-3 shows the results of gap analysis between JICA Guidelines and Angola's institutional/legislation systems on the environmental and social considerations.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Table 3-3: Gap analysis between JICA Guidelines and Angola’s institution/legislation systems on the environmental and social considerations

No	Item	JICA Guidelines for Environmental and Social Considerations (April 2010)	Angolan domestic law	Existence of gaps and policy for addressing them
1.	Underlying Principles	Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. (Appendix 1.1)	Environmental assessment studies are required for all public and private sector projects to assess impacts and develop environmental management and monitoring plans.	No difference.
2.	Information disclosure	- EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them; - EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted. (Appendix 2)	Environmental assessment reports must be prepared in Portuguese, the official language, and a summary version for the public (non-technical summary) must be prepared. However, the environmental assessment report is a proprietary document of the operator, and therefore viewing and obtaining copies is not permitted.	While there are no differences in the use of official languages and the preparation of a summary field for the public, there are restrictions on the full publication of the report, and the summary version for the public and the report for JICA are used. Note that the official government language is Portuguese and the local language is almost never used as a written language, so the publication is in Portuguese.
3.	Social Acceptability	- Projects must be adequately coordinated so that they are accepted in a manner that is socially appropriate to the country and locality in which they are planned. For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans.	For Category A and Category B projects, public consultation takes place only once after the environmental assessment report has been submitted to the Ministry of the Environment, but the relevant authorities are briefed at the planning stage.	Although there are differences, this does not preclude the implementation of two stakeholder consultations in line with JICA guidelines.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Item	JICA Guidelines for Environmental and Social Considerations (April 2010)	Angolan domestic law	Existence of gaps and policy for addressing them
		<p>(Appendix 1, Social acceptability 1)</p> <ul style="list-style-type: none"> - In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared. - Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared. <p>(Appendix 2. Environmental Assessment Report required for Category A).</p>		
4.	Scope of Impacts to be Assessed	<p>1 The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.</p>	<p>As indicated in the previous section (3), there is a set of sub-items for which impacts should be assessed, and the Ministry of Environment will present the matters to be implemented (TOR) after the EIA project is registered.</p>	<p>No difference.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Item	JICA Guidelines for Environmental and Social Considerations (April 2010)	Angolan domestic law	Existence of gaps and policy for addressing them
		<p>2. In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.</p> <p>(Annex 1. 3. Scope of impacts to be assessed)</p>		
5	Monitoring / Grievance mechanism	<p>1) During the project implementation period, the existence of situations that were difficult to predict, the implementation status and effectiveness of pre-planned mitigation measures, etc. must be ascertained, and appropriate measures must be taken based on the results.</p> <p>2) Where adequate monitoring is considered essential for proper environmental and social considerations, such as in projects where mitigation measures are to be implemented with known effects, it must be ensured that the project plan includes a monitoring plan and that the plan is feasible.</p> <p>3) Efforts should be made to publicise the monitoring results to local stakeholders involved in the project.</p> <p>4) In the event of specific indications from third parties, etc., that environmental and social considerations are not sufficient, etc., a forum should be established with sufficient information disclosure for stakeholders involved in the project to discuss and consider measures, and efforts should be made to agree on procedures to resolve the problem.</p>	<p>In the environmental assessment report: mitigation measures and monitoring content and implementation systems and reporting methods should be described. There is no provision for the publication of monitoring results.</p>	<p>As there is no provision for the publication of monitoring results, public consultations should be held regularly as part of the monitoring survey, to provide an overview of the results to residents and an opportunity to hear their views, as well as to ensure a grievance redress mechanism.</p>
6	Ecosystem and biota	<p>Projects must not involve significant conversion or significant</p>	<p>There is a strong need to conserve ecosystems and</p>	<p>No difference.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Item	JICA Guidelines for Environmental and Social Considerations (April 2010)	Angolan domestic law	Existence of gaps and policy for addressing them
7	Indigenous People	degradation of important natural habitats or important forests. All possible ways of avoiding the project's impacts on indigenous peoples must be considered. Where avoidance is not possible after such consideration, effective measures for indigenous peoples must be taken to minimise impacts and compensate for losses.	biota and to protect protected areas, etc. There are no provision on indigenous peoples.	Where indigenous peoples are identified among the affected population, an 'Indigenous Peoples Plan' should be developed in accordance with JICA guidelines to avoid, reduce or compensate.

Source: JICA Survey Team

3.5. International Finance Corporation Guidelines

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development. The IFC's Performance Standards offer a framework for managing environmental and social risks of projects. They define clients' responsibilities for managing their environmental and societal risks, are regarded as an international benchmark and have been adopted by many organisations as a key component of their environmental and social risk management (IFC, 2012).

The Performance Standards (PSs) provide guidance on how to identify risks and impacts and are designed to avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable manner (see **Table 3-4**). The IFC uses the Sustainability Framework together with other strategies, policies and initiatives to guide the business activities of the Corporation, in order to achieve the general objectives of development.

Table 3-4: The Performance Standards of the International Finance Corporation.

Performance Standards	Objectives
<p>Performance Standard 1. <u>Social and Environmental Assessment and Management System:</u> Risks and Impacts: emphasizes the importance of social and environmental management throughout the duration of a Project (any business activity that is subject to assessment and management).</p>	<ul style="list-style-type: none"> • Identification and Evaluation of Impact. Identify and evaluate social and environmental impacts, adverse or beneficial, to the project or area of influence; • Mitigation. To avoid, or when it is not possible, minimise, mitigate or compensate for adverse impacts on workers, the affected communities, and the environment; • Commitment of interested and/or affected parties. Ensure that the affected communities are

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Performance Standards	Objectives
	<p>properly aware of issues that could potentially affect them;</p> <ul style="list-style-type: none"> • Effective Management. Promote better environmental and social performance of companies through the effective use of management systems.
<p>Performance Standard 2. <u>Terms and Conditions of Employment:</u> Recognizes that achieving economic growth through job creation and income generation must be balanced against the basic workers’ rights.</p>	<ul style="list-style-type: none"> • Establish, maintain and improve the employee - management (administration) relationship; • Promote the fair treatment, non-discrimination, and equal opportunities for workers and fulfil national laws on employment and working conditions; • Protect the workforce, reporting child labour and forced labour; and • Promote safe and healthy working conditions and workers' health.
<p>Performance Standard 3. <u>Resource Efficiency and Pollution Prevention:</u> Recognises that high levels of industrial activity and urbanisation often generate high levels of water and land pollution that may threaten a community and the environment at local, regional and global levels.</p>	<ul style="list-style-type: none"> • Avoid or minimise adverse impacts on human health, and the environment by preventing or minimising pollution caused by project related activities; • Promote the reduction of emissions that contribute to climate change.
<p>Performance Standard 4. <u>Community, Health and Safety:</u> Recognises that the activities, equipment and infrastructure of a Project often bring benefits to communities including employment, services, and opportunities for economic development.</p>	<ul style="list-style-type: none"> • Prevent or minimise risks and impacts on the health and safety posed to the local community during the life cycle of the project, both routine and non-routine; and • Ensure that the safeguarding of personnel and property is carried out in accordance with legitimate measures in order to avoid or minimise risks to the safety of the community.
<p>Performance Standard 5. <u>Land Acquisition and Involuntary Resettlement:</u> Outlines involuntary resettlement referring to both transfer (relocation or loss of housing) and economic displacement (loss of assets or access to assets that leads to loss of scouse income or means of livelihood) as a result of Project land acquisition.</p>	<ul style="list-style-type: none"> • Avoid or minimise displacement by exploring designs of alternative projects; • Avoid forced removal; • Anticipate, prevent and minimise negative social and economic effects arising from the acquisition of land or restrictions on land; • Improve or restore the livelihoods and standards of living of displaced persons.
<p>Performance Standard 6. <u>Biodiversity Conservation and Sustainable Management of Natural Resources:</u> Recognises that protecting and conserving biodiversity - the variety of life in all its forms, including genetic diversity, species and ecosystems - and its ability to change and evolve is critical to sustainable development.</p>	<ul style="list-style-type: none"> • Protect and conserve biodiversity; and • Promote the sustainable management of living natural resources through the adoption of practices that integrate the needs of conservation and development priorities.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Performance Standards	Objectives
<p>Performance Standard 7. <u>Indigenous Peoples:</u> Recognises that Indigenous Peoples, who’s social identity differ from those of dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population.</p>	<ul style="list-style-type: none"> • Ensure that the development process promotes the full respect for human rights, dignity, aspirations, culture and livelihoods based on natural resources of Indigenous peoples; • Avoid adverse impacts on communities of indigenous peoples, or when not possible, minimise, mitigate or compensate for such impacts by providing opportunities for development in a culturally appropriate way; • Establish and maintain a permanent relationship with Indigenous peoples affected by the project throughout the life cycle of the project; • Promote negotiation in good faith with the informed participation of indigenous peoples when the projects are located on traditional lands or lands commonly used by indigenous peoples; • Respect and preserve the culture, knowledge and practices of indigenous peoples.
<p>Performance Standard 8. <u>Cultural Heritage:</u> Recognises the importance of cultural heritage for present and future generations.</p>	<ul style="list-style-type: none"> • Protect cultural heritage from the adverse impacts of project activities; • Promote the sharing of benefits from the use of cultural heritage in commercial activities.

3.5.1. IFC Environmental, Health and Safety Guidelines

The IFC’s Environmental, Health, and Safety Guidelines (EHS) Guidelines (IFC, 2007) are technical reference documents with general and industry-specific examples of good international industry practices. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. The EHS Guidelines prescribe minimum performance levels and measures that are generally considered achievable in new facilities using existing technology at reasonable costs. The guidelines cover issues under environmental, occupational health and safety, community health and safety, construction and decommissioning. This document presents various environmental standards which are applicable to the Project that includes air quality, noise, vibration and water quality.

These General EHS Guidelines are designed to be used together with the relevant industry sector EHS Guidelines. The EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007) are therefore also relevant to the proposed distribution line project. The guidelines cover environmental, occupational health and safety, and community health and safety, with reference to industry specific impacts and performance indicators and monitoring as indicated below.

3.5.2. IFC Environmental, Health and Safety for Electric Power Transmission and Distribution

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The IFC's Environmental, Health, and Safety Guidelines (EHS) Guidelines (IFC, 2007) are technical reference documents with general and industry-specific examples of good international industry practices. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. The EHS Guidelines prescribe minimum performance levels and measures that are generally considered achievable in new facilities using existing technology at reasonable costs.

The guidelines cover issues under environmental, occupational health and safety, community health and safety, construction and decommissioning. Industry specific impacts and management measures are included within the Guidelines, including information on construction impacts such as:

- Construction site waste generation;
- Soil erosion and sediment control from site preparation activities;
- Fugitive dust emissions and other emissions;
- Noise from heavy equipment and truck traffic; and
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fuelling activities.

Operational impacts are associated with the following:

- Terrestrial habit alteration (through right of way construction and maintenance, potential for forest fires, and avian and bat collisions and electrocutions);
- Electric and magnetic fields; and
- Hazardous materials (e.g., insulating oils/gases and fuels in addition to herbicides for right of way vegetation maintenance.

Information is also provided on Occupational Health and Safety hazards associated with live power lines, working at height, electric and magnetic fields and exposure to chemicals.

3.6. International Commission on Non-Ionizing Radiation Protection

As an independent organization, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) provides recommendations and scientific guidance on the environmental and health effects of non-ionizing radiation (NIR) to protect people and the environment from harmful exposure to NIR.

The ICNIRP has prepared guidelines for limiting exposure to electric, magnetic and electromagnetic fields that vary in frequency (up to 300 GHz). The ICNIRP guidelines are based on a careful analysis of research data on the effects of exposure to extremely low frequency fields (Extremely Low Frequency – ELF) on health and include safety margins. The guidelines were initially proposed in 1990, and were reconfirmed in 1993 and 1998, after consideration of more recent research.

The main objective of these guidelines is to establish threshold of exposure to electromagnetic fields that will provide a high level of protection for all people against known adverse health effects from

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

direct, non-medical exposures to both short, and long-term, continuous, and discontinuous radiofrequency electromagnetic fields. The ICNIRP has continued to review new studies published since 1998. Recently, draft guidelines (and two appendices) have been proposed which are currently under discussion, namely:

- **Guidelines for Limiting Exposure to Time** – Varying Electric, Magnetic and Electromagnetic Fields (100 kHz to 300 GHz), July 2018.

The ICNIRP concluded that the only effects clear in research data were those caused by currents induced in the body by electric and magnetic ELF fields. In very strong fields, these induced currents can interfere with the body's nervous system and, therefore, should be limited to levels where no such effect can occur; the ICNIRP also wanted to limit the possibility of experiencing minor shocks in strong electrical fields. While recognizing the results of studies that have found a weak association between exposure to magnetic field ELF and the risk of childhood leukaemia, the ICNIRP considered the results too weak and concluded that the findings lacked support from other sources to form the basis for exposure guidelines. Other recent revisions, including a review of the World Health Organisation (WHO, 2007), came to the same conclusion stating that the data currently available does not warrant the establishment of stricter exposure limits.

The ICNIRP guidelines have established a basic restriction on the density of electrical current induced in the body by ELF. As the density of induced currents is difficult to measure in the body, the guidelines also prescribe reference levels in terms of the most easily measured field strengths. The guidelines specify quantitative EMF levels for safe personal exposure. The ICNIRP guidelines recommend monitoring for exposure to electric and magnetic fields. A more detailed description of issues pertinent to the basic restrictions is provided in the appendices of the proposed guidelines which are accessible in the following links:

- [https://www.icnirp.org/cms/upload/consultation_upload/ICNIRP_RF_Guidelines_PCD_Appendix A 2018 07 11.pdf](https://www.icnirp.org/cms/upload/consultation_upload/ICNIRP_RF_Guidelines_PCD_Appendix_A_2018_07_11.pdf)
- https://www.icnirp.org/cms/upload/consultation_upload/ICNIRP_RF_Guidelines_PCD_Appendix B 2018 07 11.pdf.

3.7. International Legislative Framework

The Republic of Angola is a signatory to several multilateral environmental agreements (conventions, treaties and protocols) relevant to the environmental aspects of very high voltage electricity line construction activities. These agreements have been considered for this ESIA and are described in below **Table 3-5**.

Table 3-5: Multilateral Environmental Agreements relevant to the Project.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Items	Multilateral Environmental Agreements	Descriptions
1	United Nations Convention on Biological Diversity (UNCBD) ratified by Resolution No. 23/97 of 4 July; entered into force in Angola on 23 rd July 1997 (Deliberation no. 23/97).	UNCBD objectives are the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources.
2	United Nations Framework Convention on Climate Change (UNFCCC) ratified by Resolution 13/98 of 28 th August; entered into force in Angola on August 28, 1998 (Resolution 13/98).	UNFCCC aim is to stabilize concentrations of greenhouse gases in the atmosphere. Commitments and obligations were defined for all countries (called Parties to the Convention). Projects implemented on Angolan territory must respect Angolan legislation (Resolution no. 13/98 of 28 th August) that aims to minimise emissions of gases that contribute to the greenhouse effect.
3	Convention on the Conservation of Migratory Species of Wild Animals (CMS). Angola became part of this convention in 2006.	CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.
4	Basel Convention – Controlling transboundary movements of hazardous wastes and their disposal. Angola accedes to the Basel Convention, becoming the 186 th Party.	Basel Convention is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The convention is also intended to minimize the rate and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.
5	Bamako Convention on the Prohibition of the Importation of Hazardous Waste and the Control of Transboundary Movement and Management of Hazardous Waste in Africa (its accession approved through Accession Letter No. 1/16 of 23 rd August).	It establishes obligation on African Union members to prohibit the import of radioactive and hazardous waste, as well as its disposal into oceans and inland water bodies. Countries are also obliged to minimise the transboundary movement of such waste and must obtain the country's consent if it needs to cross it.
6	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES or Washington Convention) (Angola accession was approved through Resolution No. 1/17 of 14 th February).	CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Items	Multilateral Environmental Agreements	Descriptions
7	Convention on Wetlands (Ramsar). Angola is the newest member of the Convention on Wetlands of International Importance (its accession approved through Accession Letter No. 4/16 of 23 August 2016).	The Ramsar Convention promotes an integrated approach to managing wetland systems so that human uses of these areas are carried out in a way that maintains their natural "capital" for future generations. It provides a list of wetlands of international importance.
8	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (Angola accession was approved through Resolution No. 14/03 of 15 th April).	Bonn Convention is an international agreement that aims to conserve migratory species throughout their ranges. CMS has two Appendices, namely Appendix I – Endangered migratory species and Appendix II – Migratory species conserved through Agreements.
9	Convention Concerning the Protection of the World Cultural and Natural Heritage. This Convention was ratified by Angola on 7 November 1991.	To encourage the identification, protection, and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. The Convention defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List.

Chapter 4

ENVIRONMENTAL AND SOCIAL BASELINE

4. ENVIRONMENTAL AND SOCIAL BASELINE

This Chapter describes the environmental baseline data regarding the implementation of the 60 kV DL Project. These data include both historical and recent information, from previous assessments and recent field surveys conducted in the Project site. Due to its characteristics, local and regional importance this section also highlights socioeconomic aspects of the Project area.

4.1. Physical Environment

In the following sections are presented the environmental baseline of the project area of insertion, with focus on climate, geomorphology and air quality aspects of the Project.

4.1.1. Climate

Huíla Province is located in the alternating wet and dry climates of the intertropical trade winds regions, as illustrated in **Figure 4-1** below. It is a temperate climate modified by altitude, i.e., the climate gradually changes to semi-arid steppe (BSh), up to the base of the Chela escarpment, west of Lubango about 100 km from the coastline, where it has tropical characteristics with a well-defined wet season (Aw), with a distinct dry season in winter, according to Koppen's climate classification. Further inland, the climates have temperate thermal conditions, being warmer in the region of Lubango (Cwa) and cooler to the east (Cwb).

According to the classification of Thornthwaite (1948), the climate is humid mesothermal, with moderate water deficiency in winter and with summer concentration of thermal efficiency of the megathermal type (B1 B'2 4wa').

- The rainy season: from October to April, characterized by average temperatures between 19° and 21°C and average precipitation between 600 and 1200 mm (CEPT, 1968). March is the rainiest month.
- Dry season (cacimbo), in the remaining months of the year, with average temperatures between 15.5 and 19.0°C, accentuated daily temperature variation, absence of rainfall and, consequently, very low relative humidity.

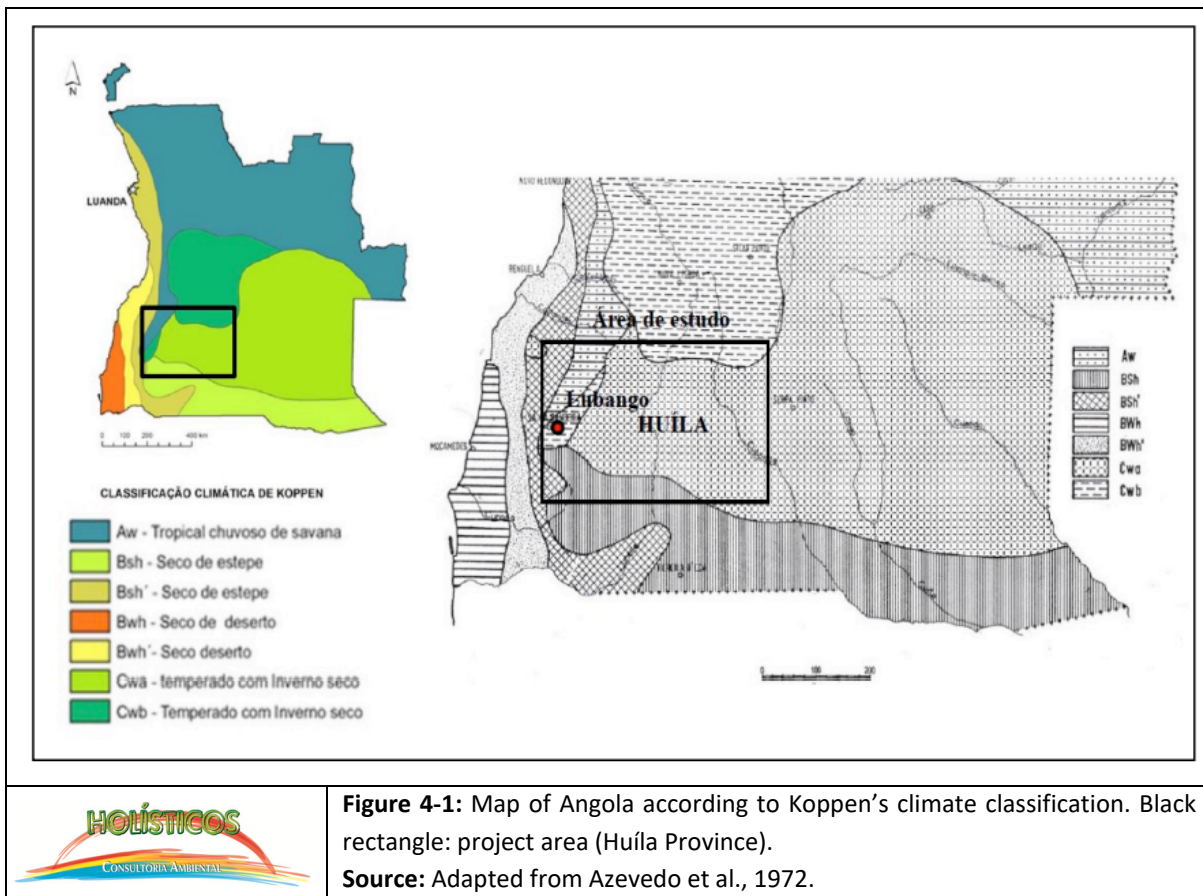


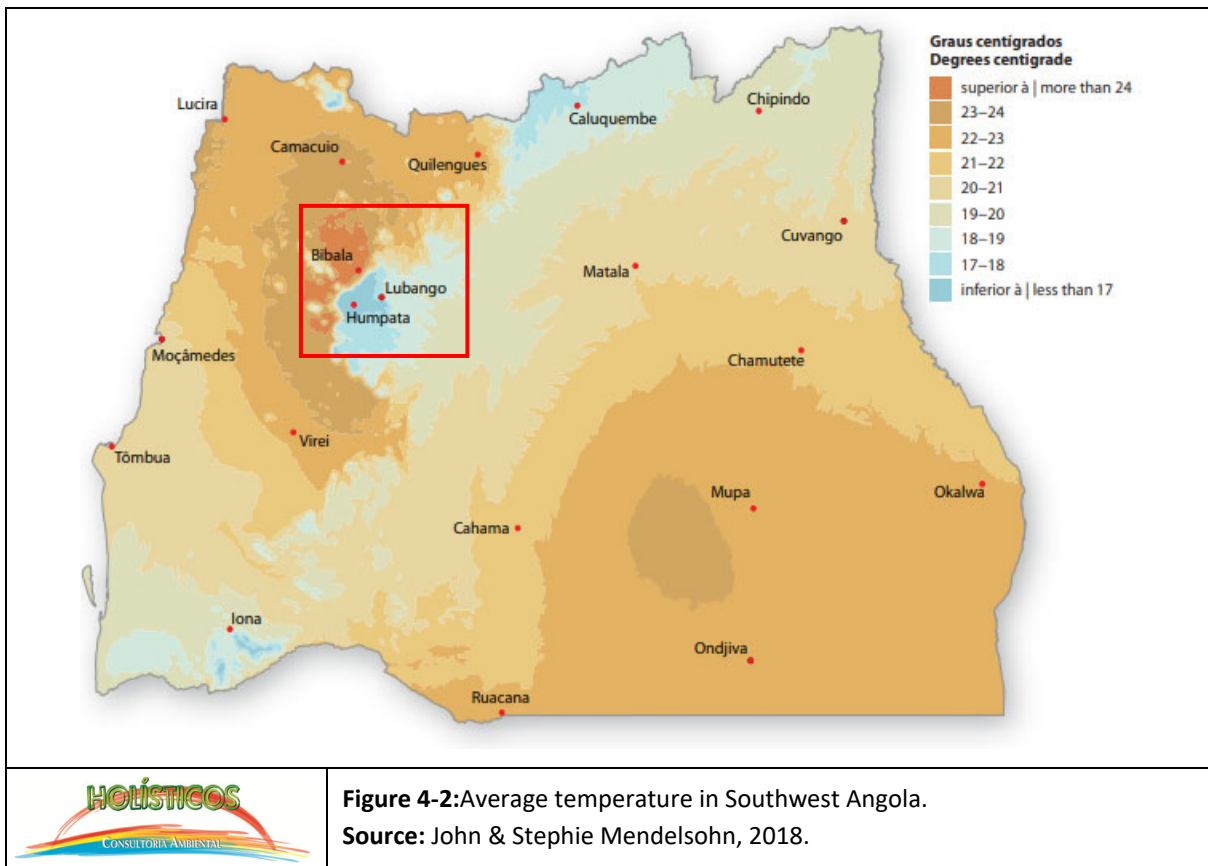
Figure 4-1: Map of Angola according to Koppen's climate classification. Black rectangle: project area (Huíla Province).
Source: Adapted from Azevedo et al., 1972.

Temperature

According to John & Stephe Mendelsohn (2018)², the average maximum and minimum temperatures in the region, respectively during the warmest months (January or February in most areas) and the coldest (June or July). The hottest areas in summer are in the south-east, while the coldest places in winter are on the Chela Plateau west of Lubango (see **Figure 4-2**). There is a strong divide along the Escarpment between the east and west during the coldest months. Temperatures in the east then plummet, dropping below 0°C on some nights. To the west, the coastal plain maintains warmer, more stable temperatures that are moderated by maritime air from the Atlantic (see **Figure 4-2**).

² The book SouthWest Angola is compilation of facts, figures, maps and portraits of South West Angola. All this reference material is presented in a geographical context, because only geography provides a framework across which diverse strands of information can be woven. The book is thus a modest tapestry of information about livestock uses, vegetation types, incomes, wildlife, house designs, soil types, rainfall, and more. It was produced out of five activities: household surveys, mapping of infrastructure, field excursions on the ground and in the air, desktop mapping, and consulting experts and the literature.

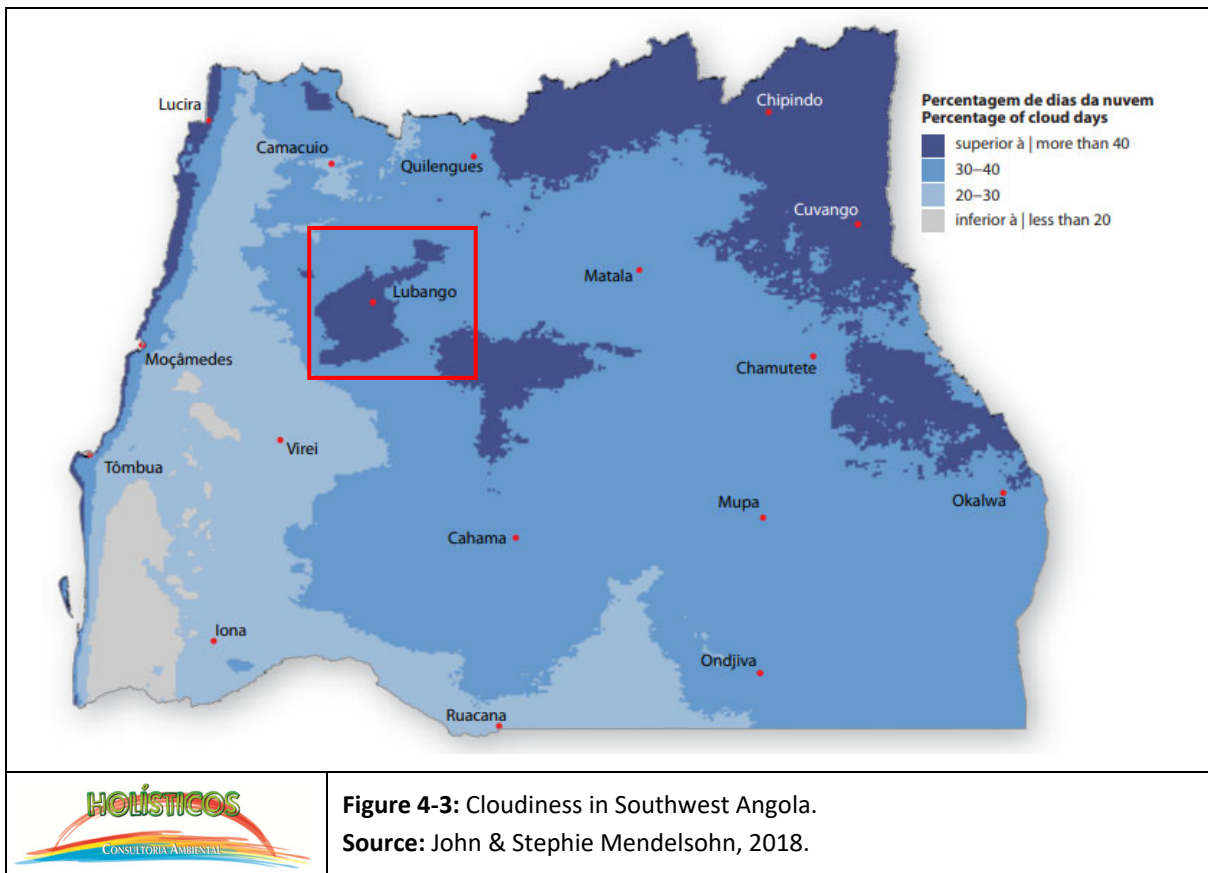
Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Cloud Cover

The **Figure 4-3** shows the percentage of days on which clouds occur each year in Southwest Angola. The most overcast areas are along the coast and where elevations are highest. The Planalto in the northeast, the Chela Plateau near Lubango and even the isolated massif of Serra da Neve all experience cloud cover for more than half of the year.

Fog originates offshore where moist sea air meets the cold waters of the Atlantic Ocean. The cold, wet air condenses to form a belt of fog that frequently pushes inland, sometimes across the coastal plain; occasionally even close to the escarpment. Fog is most frequent in the morning and it generally disappears during the middle of the day when the sun warms the moist air, causing water droplets to vaporise (John & Stephe Mendelsohn, 2018).



Winds

The wind experienced at any given location is highly dependent on local topography, geomorphology, and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Huíla, particularly in Lubango, experiences mild seasonal variation over the course of the year. The windier part of the year lasts for four months, from May to September, with average wind speeds of more than 6.0 miles per hour. The windiest day of the year is July 15, with an average hourly wind speed of 7.4 miles per hour. The calmer time of year lasts for 7 months, from September to May. The calmest day of the year is March 11, with an average hourly wind speed of 4.7 miles per hour (weatherspark, 2020). The calmest day of the year is August 28, with an average hourly wind speed of 7.0 miles per hour (see **Figure 4-4**) shows annual averages of wind in Huíla province, where the distribution line is located (weatherspark, 2021). Apart from the data from the colonial times (1940-1970) there is no official data on wind for this region of Angola.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

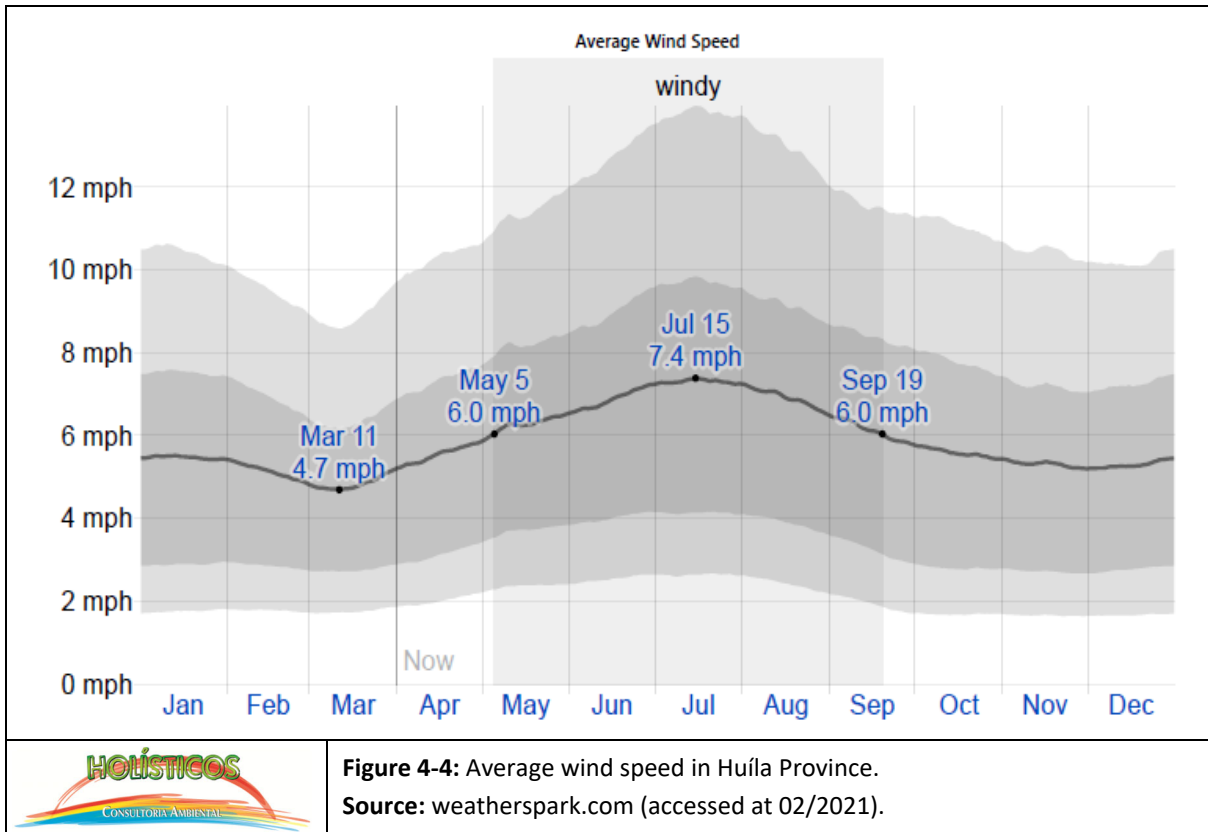


Figure 4-4: Average wind speed in Huíla Province.
Source: weatherspark.com (accessed at 02/2021).

4.1.2. Geology

The main geological formations in the Huila region (see **Figure 4-5**) are mainly orogenic granites and several Precambrian formations. The most recent formations occur in the south and southeast of the Huila region, and range in age from Neogene to Quaternary.

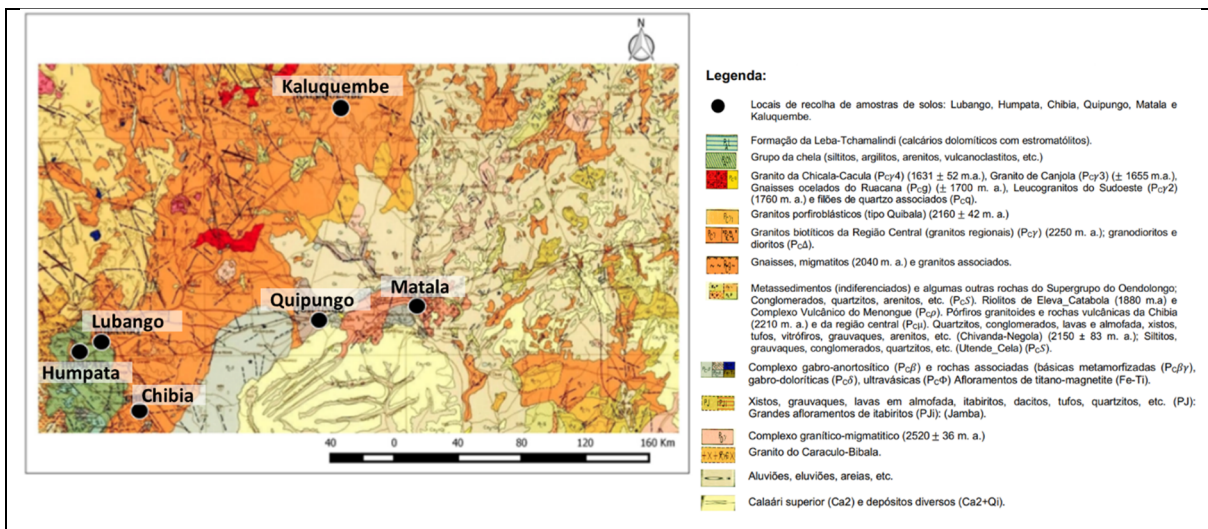


Figure 4-5: Geological setting of Huila province.
Source: Adapted from Carta Geological Map of Angola, LNICT (1980).

The Leba Formation is composed essentially of dolomitic limestones with stromatolites, which are fossils originated by bacteria and cyanophytes and represent one of the oldest traces of life on Earth, having appeared in the Lower Precambrian, i.e., more than 3500 million years ago. This formation overlies the sedimentary sequence of the Chela Group. In order to understand the events and processes that affected southwestern Angola, during the Mesoproterozoic (1600 to 900Ma), Ruth (2013) makes an assessment of the compositions, lithologies, depositional environments, trace elements and stable isotopes of the Leba Formation (Pinho et al., 2016).

The main formations that constitute the Chela Group from base to top, among which: the Tundavala Formation (20 - 80 m), Humpata Formation (100 - 300 m), Bruco Formation (100 m) and Cangalongue Formation (72 m), in a sequence of volcano-sedimentary rocks over 600 m, deposited in an extensive epicratonic basin over the intrusive mass through a discordance with a thickness of about 300 m of detrital materials, essentially sandstone rocks intercalated with volcanoclastic and conglomeratic rocks showing typical syngeneic sedimentary structures, indicating a fluvial-marine type sedimentation environment, in almost horizontal layers (Humpata Formation). There is a layer of red volcanoclastic rocks, intercalated in the sandstone rocks, 4-5 meters thick, with a clear extension at the regional scale, which corresponds to the last trace of explosive volcanic activity in the Proterozoic Chela basin (Correia, 1976; Pinho et al., 2016).

4.1.3. Geomorphology

According to Jessen (1936) and Feio (1946), the geomorphological evolution of Angola, defines five plateaus of aplanation, separated by steps and defined from east to west, in the geomorphological evolution of territory. (Pinho et al., 2016). In the region of southwest Angola, where the province of Huila is inserted, Feio (1964; 1981), based on the interpretation made by Jessen (1936), considered, from east to west, 4 major geomorphological elements, to which are made to correspond, in parentheses, the units defined by Jessen:

- I. Main Plateau (Surface IV of Jessen). The western boundary of the Main Plateau, between Huila Province and the Tampa River (Hungueria Gates), ends against the step of the Humpata-Bimbe Plateau (Figure 3.3); to the south, this unit ends abruptly at the precipice leading to the Intermediate Surface a few hundred meters below. The Main Plateau, decreases in altitude in the south and southeast direction until 1750 m in Lubango, 1450 m in Chibia and 1250 m in Pocolo and Chibemba, forming a very regular surface, cut by broad notch and upstream valleys (of the Cunene River tributaries) and disturbed by residual reliefs of granites, diorites, porphyries or imposing norite dikes, to the north, and by clusters of gabbro blocks, to the south (Pereira et al, 2013).
- II. Humpata-Bimbe Plateau (Jessen Surface V). This surface is characterized by three main blocks separated by fault systems: (i) Bimbe Block at elevations of 2330-2200 m bounded to the south by the ENE-WSW direction fault system between Lubango and Humpata, and the Leba River valley according to E-W direction; ii) Humpata-Cangalongue Block, at elevations of 2000-1800 m, bounded by the Lubango-Humpata fault system and the NW-SE fault between Leba and Hunguéria; iii) Tchivinguiro-Hoque Block, situated west of the Leba-Hunguéria fault

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

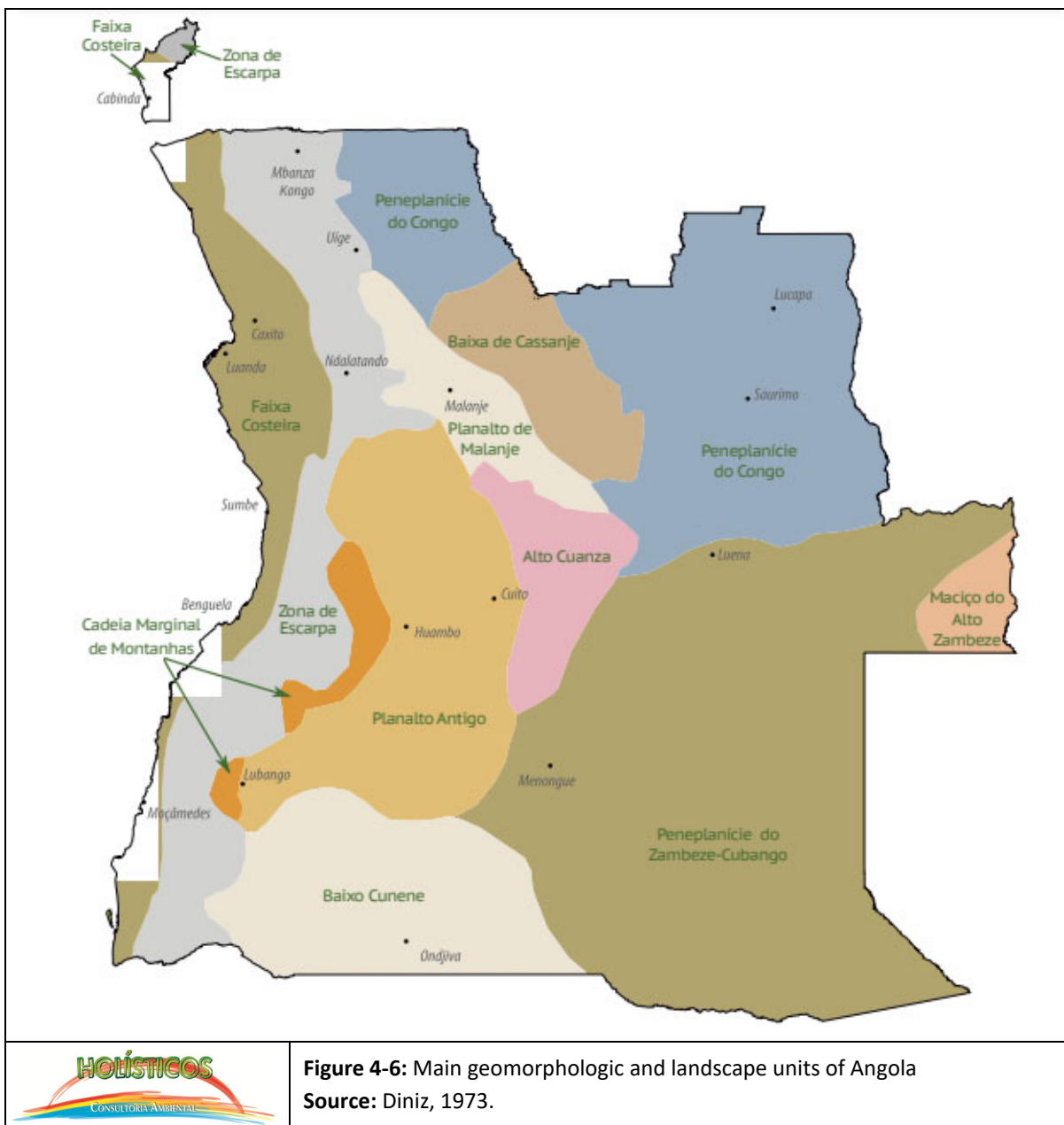
system, tilted towards the edge of the escarpment, with elevations up to 1800 m. (Pereira et al., 2013).

Intermediate Surface (Jessen Surfaces III and II) which is attributed to the large escarpment of the Serra da Chela. In this Intermediate Surface, Jessen considers that the Bibala surface, corresponds to the aplanation surface (Surface III), but for Feio, it is considered a plateau of the Intermediate Surface (Pinho et al., 2016). The Bibala Surface is considered a foothill aplanation of the Chela (Pereira et al., 2006; 2013).

The escarpment of the Intermediate Surface is quite irregular. In the Humpata region, large reliefs of post-tectonic granites and leucogranites with sub-spherical summit dominate, or else elongated ridges of dolerites and norites with dominant NNE direction and crests of schists and amphibolites with marble benches with WNW direction; the aplanation develops at elevations of 650 m. South of Cainde, in the Virei region, the peneplain is more regular at elevations of 700 m, but the transition scarp to the Main Plateau is marked by important reliefs of recrystallized porphyries, gneisses and migmatites, and also by dikes of norites. Very close to Cubal, the escarpment recedes significantly to the east and assumes a well-defined upper step at the western limit of the Anorthosite Complex at an elevation of 1300 m and an imprecise step when it settles over red granites, quartzites and dolerite sills, rocks cut by the Tchaviva and Tchipeio rivers, tributaries of Cubal (Pereira et al., 2013).

III. Finally, the westernmost surface that Feio (1964; 1981) designated as Atlantic Flexura (Jessen's Surface I), set in the rocks of the crystalline soco, with a steep slope between 500 m and 250 m, which from this elevation is covered by the sedimentary deposits of the coastline (Pinho et al., 2016). To the east of Huíla province there is an Interior Plateau that constitutes most of the eastern area, with altitudes on the order of 1500 m.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



4.1.4. Pedology

According to the FAO-UNESCO soil classification system, the project area is, mainly, characterized by leptosols, cambisols, and finally by ferrasols. From a general pedological point of view Huila Province is dominated by soils of the ferrassol or ferralitic type (red, orange, yellow, and brownish), related to the granitic formations extensively represented therein. The ferralitic soils have fine or medium to fine textures, with colours ranging from yellowish to reddish, composed of kaolinite minerals and iron and aluminium oxides, and may have laterite concretions dispersed or in layers at varying depths, forming more or less hard benches. Its behaviour in the production of adobes for raw earth construction is mainly dictated by its high shrinkage index.

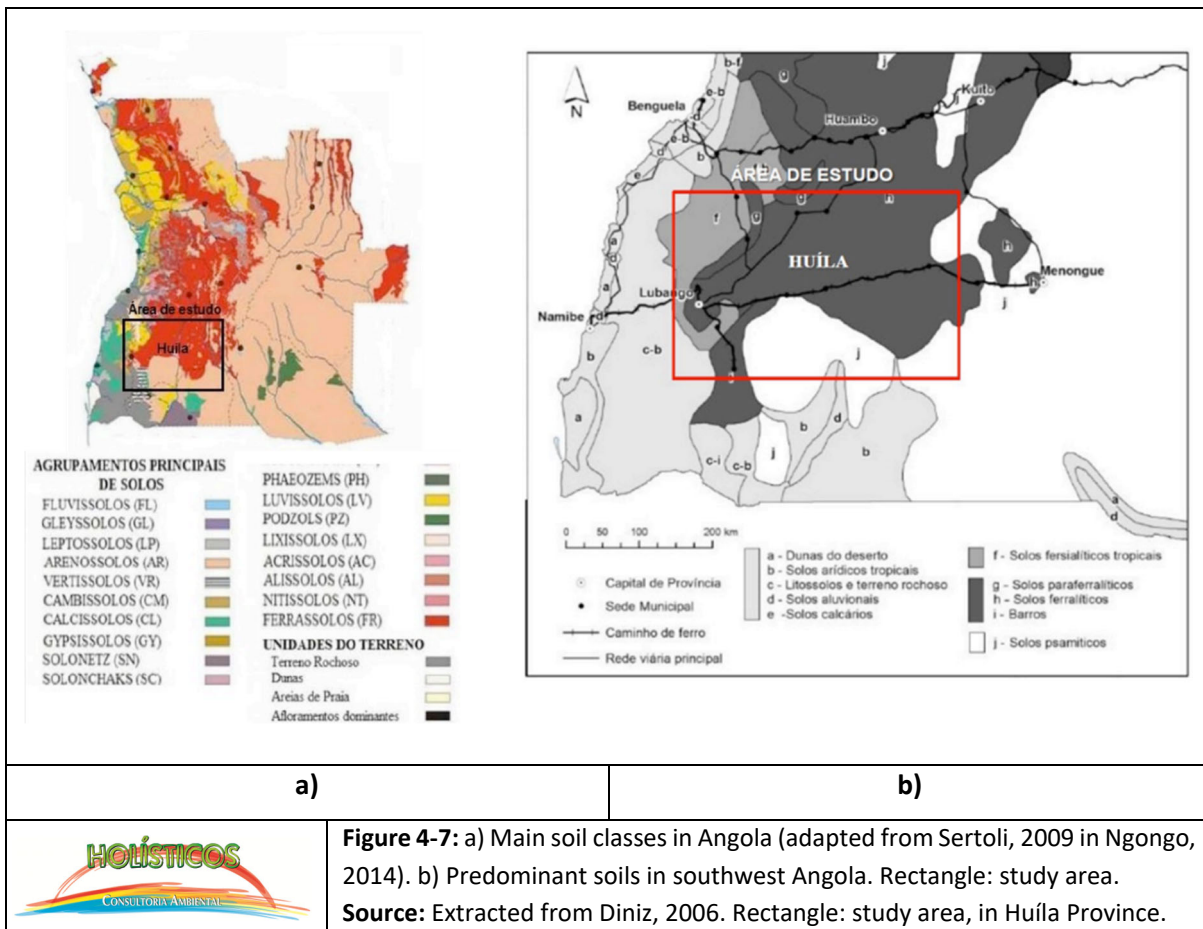
Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

According to Sertoli (2009), the ferro-solos group encompasses ferroferric soils, weakly ferroferric soils, sandy frank psamoferric soils, para-ferric soils, and eutro-para-ferric soils. These soils have low pH with high iron and aluminum sesquioxide content, good drainage, and low nutrient content. In addition to these soils, but occupying less extensive areas (especially in the south and southeast of Huila Province), there are also soils of the arenosols class that include psamorregosols, oxipsamic soils, and sandy-frackish psamoferraic soils. In addition to the previously mentioned groups, the fersiallic soils are the ones that do not fit into either, falling into the reference group of Cambisols (Cambisols). The alluvial soils, which have some extension in this area, develop in wide valley bottoms, are poorly developed, formed by very heterogeneous stratified sediments from fluvial deposits. They have little thickness, abundant stoniness, excessive salts, with a higher incidence of coarse textures further south (Diniz, 2006).

Arenosols comprise soils with sandy texture, including soils developed on residual sands after alteration of in situ sediments or rocks generally rich in quartz, and soils developed on recently deposited sands, such as desert dunes and beach sands (WRB, 2006). According to Sertoli (2009), in association with climate, these soils occur from arid to humid and from very cold to very hot climates. The main characteristic that Arenosols possess, is that they have in common sandy texture, generally accounting for their high permeability and low water and nutrient holding capacity (Ngongo, 2014).

In addition to the broadly representative soils mentioned above, in a narrow band in the northwest and southwest of the Huila Province, soils of the limestone class (Calcissolos and Cambissolos), Oxisialitic (calcareous Luvisolos), Lithosols (Leptossolos), and finally the Vertissolos occur in small proportions.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



4.1.5. Air Quality

The most abundant polluting gases in the Project region are carbon dioxide (CO₂) and methane (CH₄). Among the gases with the greatest implications for human health are nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO₂) and small suspended particles (PM₁₀). As has been the case in developing countries that are beginning their industrialization process, there has also been a high influx of the population to urban centre in Lubango city, in this case increased by the war situation experienced. The growth of unplanned urban areas and the anarchic development of various sectors of industry have been factors that have contributed to the increase in air pollution levels (MINUA, 2006).

Because of the lack of specific air quality legislation in Angola and a monitoring network, there is no real data on air quality in Angola. However, based on information from the specialty literature on air pollution and knowledge of the reality of the country, it can be assumed that the predominant emissions to the atmosphere in the country are those from the combustion of fossil fuels. The following sources can be identified:

- Vehicles in circulation;
- Generators used for the supply of energy;

- Torches of oil production and burned.

Road transport is responsible for most emissions of CO (carbon monoxide), COVNM (non-methane volatile organic compounds) and lead CH₄ (methane) emissions come almost as much as possible from the final deposition of municipal solid waste, while water treatment plants can be considered significant sources of NH₃ (ammonia) and N₂O (nitrous oxide). The large geographical area, existing water bodies and meteorological factors also condition the air quality of Angola.

Regarding the air quality of Huíla province in general, although no specific monitoring has been performed, it can generally be considered as a good quality region due to the low existence of industrial and burned. In addition, there are only small-scale agricultural activities, and the city design of Lubango still do not have significant road traffic.

There is no air quality legislation in Angola. In this context, the International Finance Corporation (IFC) guidelines and best practices were used as applicable to the Project. For ambient air quality standards, the International Finance Corporation General Environmental, Health and Safety guidelines (IFC, 2007)³ require that:

“Solid particles emissions from dust do not result in concentrations of pollutants that meet or exceed established limits and relevant environmental quality standards in matters of environmental quality, by applying legal standards or, in the absence of such standards, the current World Health Organization (WHO)⁴ Air Quality Guideline, or other internationally recognized sources.”

JICA prepares drafts of mitigation measures including avoidance, minimization, and compensation as well as drafts of monitoring plans and of institutional arrangements for environmental and social considerations.

In September 2021, three spot measurements of air quality (concentration of particulate matter - PM_{2.5} and PM₁₀ at certain points in the atmosphere of the Project implementation region) were performed. Measurements on noise environment were also. The measurements were taken for one (1) hour, as illustrated in **Table 4-1** and **Table 4-2**. The air quality measurements were performed using a Haz-Dust equipment⁵ (particulate matter monitor) model EPAM-5000 (see **Figure 4-8**) properly calibrated together with the Hold Peak HP-866B Pro Anemometer, where it was possible to obtain the minimum and maximum wind speed and air temperature at the PM measurement sites.

³ International Finance Corporation (April 30th, 2007) Environmental, Health and Safety Guidelines: General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality.

⁴ WHO. Air Quality Guidelines Global Update, 2016. PM 24-hour value is the 99th percentile.

⁵ The Haz-Dust monitor is a device designed to measure the screening level for ambient air pollution. Its unique sampling design allows you to collect data in real time and perform a gravimetric analysis of the filter using the FRM 47mm located directly behind the optical sensor.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Figure 4-8: Particulate matter measuring instrument used.

Table 4-1 and **Table 4-2** present the results of the spot measurements of particulate matter (PM_{2.5} and PM₁₀) and wind in the areas defined for the construction of the Arimba substations and along the distribution line route. **Figure 4-9** shows the location of the sampling points.

Table 4-1: Results of particulate matter measurements in the Project region (PM_{2.5}).

Location Geographical Coordinates	Temperature (°C)	Wind Direction	Wind (km/h)		Parameters (mg/m ³)		
			Maximum	Minimum	Maximum	Minimum	TWA*
Selected Locations							
Point 1 – Lubango East Lubango SS S 14°55'40,4'' E 13°39'25,1''	28.6	SW150	22	4.7	0.051	0.006	0.032
Point 2 – Arimba Thermal Power Plant S 14°57'14,6'' E 13°34'47,9''	36.6	SW120	43	5	0.059	0.015	0.024

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Location Geographical Coordinates	Temperature (°C)	Wind Direction	Wind (km/h)		Parameters (mg/m ³)		
			Maximum	Minimum	Maximum	Minimum	TWA*
Selected Locations							
Point 3 – Arimba Commune S 14°56'48,2" E 13°35'38,1"	37.8	SW120	10	4.6	0.116	0.002	0.017

*TWA: Time Weighted Average.

Source: Holísticos, 2021.

Table 4-2: Results of particulate matter measurements in the Project region (PM₁₀).

Location Geographical Coordinates	Temperature (°C)	Wind Direction	Wind (Km/h)		Parameters (mg/m ³)		
			Maximum	Minimum	Maximum	Minimum	TWA*
Selected Locations							
Point 1 – Lubango East Lubango SS S 14°55'40,4" E 13°39'25,1"	28.6	SW150	20	5.6	0.058	0.006	0.032
Point 2 – Arimba Thermal Power Plant S 14°57'14,6" E 13°34'47,9"	36.6	SW120	43	5	0.054	0.009	0.028
Point 3 – Arimba Commune S 14°56'48,2" E 13°35'38,1"	37.8	SW120	10	4.6	0.118	0.002	0.021

*TWA: Time Weighted Average.

Source: Holísticos, 2021.

There is no specific legislation on air quality in Angola. In this context, the International Finance Corporation (IFC) guidelines and best practices applicable to the project were used. For ambient air quality standards, **Table 4-3** presents the IFC Environmental, Health and Safety general guidelines published in 2007⁶.

⁶ International Finance Corporation (April 30, 2007) Environmental, Health and Safety Guidelines: General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

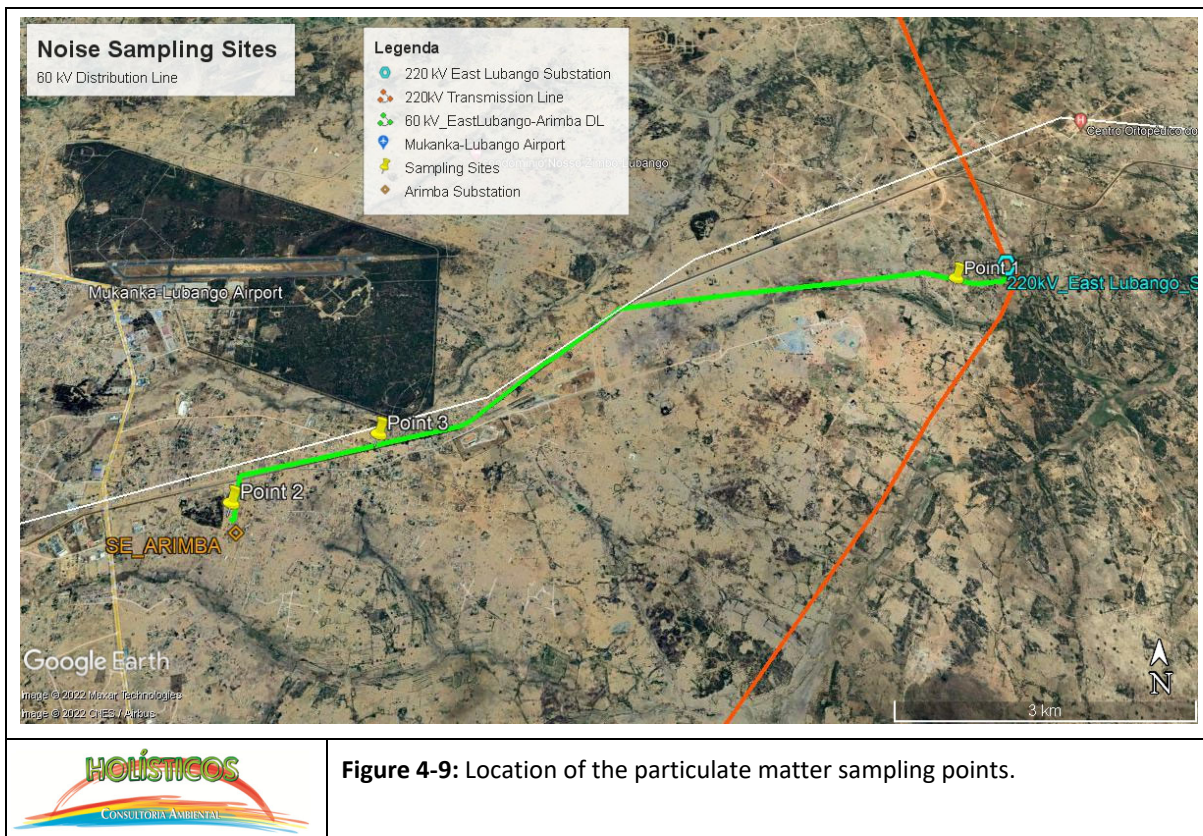


Figure 4-9: Location of the particulate matter sampling points.

Table 4-3: IFC Air Quality Guidelines.

Pollutant	Average Period	Air Quality Standard (mg/m ³)
PM _{2.5} e PM ₁₀	Annual Average	35
	24 Hours	75

Source: IFC, 2007.

According to the time of the measurements taken, an extrapolation from one (1) hour to 24 hours was made by comparing the maximum average PM_{2.5} and PM₁₀ concentrations in **Table 4-1** and **Table 4-2** with the standard set by IFC (see **Table 4-3**), no values above the air quality standard were recorded during the measurements. No approach to the limit value was recorded, nor did it exceed the air quality standard value of PM_{2.5} and PM₁₀ set by IFC (see **Table 4-1** and **Table 4-2**).

From all measurements performed for PM_{2.5} and PM₁₀, the maximum emission value of particulate matter was 0.118 mg/m³ for the Arimba communal headquarters. Considering the location of the Arimba region and the prevailing wind direction at this site, no changes in PM_{2.5} and PM₁₀ values in the region's atmosphere are expected at the start of project implementation activities.

Given the current context in the project's implementation region, the Project's construction and operation activities, and the opening of new access roads including the use of existing ones, it is not expected that the current situation will be notably altered either in the area where the substations are located or along the route of the Project's distribution line, as well as in their immediate surroundings.

4.1.6. Noise and Vibration

Considering the proximity to the Arimba Commune and the high anthropic impact in the area, the distribution line route and substation site are subject to noise emissions that may interfere with the sound condition of the area. On the other hand, the movement of vehicles and the presence of residential areas are also a source of noise to be considered.

Sound is a normal and desirable part of human life, however, when noise is imposed on people it can lead to disturbances **on living environment**, nuisances and other inconvenient effects. Noise is measured and quantified in decibels (dB). Setting the logarithmic decibel scale means that noise levels do not change or add according to simple linear arithmetic.

Table 4-4: Shows the noise sources and noise levels and the corresponding typical tolerance levels.

Causes	Noise level, dB(A)	Tolerance
Space launch (rocket) at 100 meters, firing of a firearm	140	Intolerable
Machines in a ship's workshop, rock concert	120	Intolerable
Textile factory, press room with presses in operation	100	Too Noisy
Highway, yelling	80	Noisy
Warehouse, restaurant, speech	60	Noisy
Quiet residential neighbourhood (ambient level)	40	Calm
Recording studio (ambient level)	20	Very calm
Hearing limit for normal youngsters	0	Very calm

Source: Bies & Hansen, 2009.

The term “sound level” is usually used to describe two (2) different sound characteristics: power and sound pressure. Every sound producing source has a Sound Power Level (SPL). The sound power level is the acoustic energy emitted by a single sound source and is an absolute number that is not affected by the surrounding environment. The acoustic energy produced propagates through means such as pressure fluctuations. These pressure fluctuations, also called Sound Pressure Levels (SPL), are what human ears hear and microphones can measure. Note that sound is physically qualified by amplitude and frequency. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascal). The reference sound pressure corresponds to the typical limit of human hearing. For the average listener, a 3 dB change in broadband sound is considered “almost noticeable”; a change of 5 dB is considered “clearly noticeable”; a change of 10 dB is considered a doubling (or decreasing if the sound is decreasing) of the apparent volume. Sound waves can occur at several different wavelengths, also known as frequencies. Frequency is measured in hertz (Hz) which is the number of wave cycles per second.

The typical human ear can hear frequencies ranging from 20 to 20,000 Hz. Normally, the human ear is more sensitive to sounds at mid frequencies (1,000 to 8000 Hz) and less sensitive to sounds at lower and higher frequencies. As such, the A-weighting Scale was developed to simulate the frequency response of the human ear that resembles the typical sounds of environmental levels. The A-weighting

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Scale emphasizes mid-range sounds and strips high and low frequencies. For any sound level the A-weighting Scale has been expressed in weighted decibels, or dBA.

In Angola there is no guidance or legislation on noise levels during the exploratory or operational preparation phase. However, IFC's Environment, Health and Safety (EHS) guidelines provide criteria and guidelines that have been adopted and are described below. The IFC EHS guidelines provide criteria for the noise levels that have been adopted for this Project. The criteria state as follows:

“The sound impact shall not exceed the levels given in Table 1.7.1 or result in a maximum increase of 3 dB background levels at the nearest off-site receivers.” Table 1.7.1 of IFC’s EHS guidelines is shown in **Table 4-5**, taken directly from the IFC document.

Table 4-5: Noise levels according to IFC guidelines on EHS.

Receptor	Established Noise Levels – 1-hour LA _{eq} , dB(A)	
	Daytime (07:00–22:00)	Night-time (22:00–07:00)
Residential, industrial and educational zones	55	45
Industrial, commercial	70	70

Source: IFC, 2007.

In order to obtain detailed information about the noise environment in the areas surrounding the Arimba substations and along the 60 kV distribution line route, three noise measurements were carried out at strategically defined points (see **Table 4-3**), lasting 15 minutes for each point. The measurements were performed using noise measurement equipment, consisting of a Brüel & Kjær precision sound level meter, model 2245. A Brüel & Kjær ZC 0026 preamplifier and a Brüel & Kjær 4191 microphone were connected to this equipment. The following parameters were used for the interpretation of the results:

- LA_{eq}: equivalent continuous noise level. This is calculated by means of a formula based on the principle of equality of energy (calculation carried out by the appliance). It is a level used to define the continuous value of the equivalent noise in energy existing at the measurement site;
- LAF_{max}: is the highest environmental noise level that occurs during the measurement time. It represents the noise that occurred above 0.1% of the measurement time;
- LAF_{min}: is the lowest environmental noise level that occurred during 0.1% of the measurement time;
- LC_{peak}: is the maximum noise level (peak) during the measurement.

For each series of measurements, a calibration was performed, *in situ*, before the measurements were taken. During the measurements the prevailing wind speed and direction were recorded (using the Hold Peak HP-866B Pro Anemometer, see **Figure 4-10**) and the geographic coordinates were registered. Relevant aspects/actions were also observed and recorded during the measurement period. The results, GPS coordinates of the sites and some additional information are presented in **Table 4-3**.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Figure 4-10 presents the evidence of the sound environment measurements carried out at some points, mentioned in Table 4-6., including graphs, equipment photos and Google maps images.

Table 4-6: Results of the measurements carried out in the project area.

Location Geographical Coordinates	Date	Time	Duration (min)	Measured Noise Levels (dB)				Observed Noise Sourced and Notes
				LA _{eq}	LAF _{max}	LAF _{min}	LA _{pico}	
Selected Locations								
Point 1 – Lubango East Lubango SS S 14°55'40,4'' E 13°39'25,1''	13/09/21	10h00	15	53.6	83.7	17.1	105.3	Measurement at the boundary of the East Lubango substation site. Noise from motorbikes (65%), Poaires primary school (25), and Omatapalo Quarry (10%).
Point 2 – Arimba Thermal Power Plant S 14°57'14,6'' E 13°34'47,9''	13/09/21	14h40	15	61.6	80.7	40.7	92.5	Measurement in the future site of the Arimba substation, adjacent to the Arimba Thermal Power Plant. Noise from the operation of thermal power plant generators and other equipment (100%).
Point 3 – Arimba Commune S 14°56'48,2'' E 13°35'38,1''	13/09/21	15h45	15	51.7	53.9	51.1	63.6	Measurement at the communal headquarters of Arimba. Noise from the secondary school (65%), motorbike traffic (25) and residences (10%).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

<p>Noise Measurement</p>	<p>Graph of the noise measurement in Arimba.</p>	<p>Noise measurement point in Arimba, Google maps image.</p>
<p>Noise reader.</p>	<p>Hold Peak HP-866B Pro Anemometer used during measurements.</p>	<p>Noise measurement point at the future site of the Arimba substation.</p>
	<p>Figure 4-10 Evidence of noise measurements (photos, graphs, measuring points and equipment used).</p>	

The values recorded during the three noise measurements confirm that this is an area with high anthropic interference on the sound environment with values exceeding 50 dB (Leq) at the three sampling points as a result of the road traffic in the main road and current mining and industrial activities (Omatapalo quarry).

4.1.7. Vegetation

Introduction

The natural vegetation formations that predominate in the region of the Huila Province are open forests (brachystegia and julbernardia), dense forest (xerophytic vegetation), baledos, pseudo-steppe formation, and vegetation consisting of very rare herbaceous strata where the predominant species is loudetia simplex. However, the area of influence of the project the vegetation is quite sparse particularly within the corridor where the distribution line is to be installed.

Methodology

Before the site visit a bibliographical survey was carried out in order to obtain preliminary data on the natural vegetation cover of the area of influence of the Project. This was followed by a field visit to verify in loco the current situation, compared to the original situation. The methodology of general research, collection of plant specimens and visual observation was used to characterize the vegetation and compile an inventory of plant species found around direct and indirect influence areas of the project. To estimate the relative abundance of species, the DAFOR scale was used (D=Dominant; A=Abundant; F=Frequent; O=Occasional; R=Rare).

Results and Discussion

According to on-site observations, most of the native vegetation on the project area has been completely degraded by human activity, with no longer any solid old formations. The main plant species found in project area of influence are referred in **Table 4-7**. It should be noted that no significant and relevant vegetation patches have been identified in the corridor of the distribution line. A few shrubs and isolates trees exist within the right-of-way corridor and these can easily be avoided during tower sitting.

Table 4-7: List of plant species in the Project Area.

Scientific name	Common name	LVEA	IUCN Status
<i>Combretum collinum</i>	Variable bush-willow	NE	LC
<i>Cassia angolensis</i>	Angolan cassia	NE	LC
<i>Pericopsis angolensis</i>	East-African- Afrormosia	Vul	LC
<i>Brachystegia boehmii</i>	Prince of Wales feathers	NE	LC
<i>Brachystegia spiciformis</i>	Zebrawood	Vul	LC
<i>Brachystegia floribunda</i>	Musobo	NE	LC
<i>Brachystegia longifolia</i>	Mubombo	NE	LC
<i>Parinari curatellifolia</i>	Bambara	NE	LC
<i>Julbernardia paniculate</i>	Mutondo	NE	LC
<i>Diospyros kirkii</i>	Large-leaved jackal-berry	NE	LC
<i>Pteleopsis Anisoptera</i>	Four-winged stink-bushwillow	NE	DD

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Scientific name	Common name	LVEA	IUCN Status
<i>Burkea Africana</i>	Wild seringa	NE	LC
<i>Baphia massaiensis</i>	Sand camwood	NE	LC
<i>Commiphora mollis</i>	Soft-leaved commiphora	NE	LC
<i>Terminalia sericea</i>	Silver terminalia	NE	LC
<i>Spirostachys Africana</i>	Tamboti	NE	LC
<i>Pterocarpus lucens</i>	Small-leaved bloodwood	NE	LC
<i>Dichrostachys cinereal</i>	Chinese lantern	NE	LC
<i>Tarchonanthus comphoratus</i>	Camphor bush	NE	LC
<i>Haplocoelum foliolosum</i>	Northern galla-plum	NE	LC
<i>Buxus benguellensis</i>	Benguela's Bush	NE	LC
<i>Baikiaea plurijuga</i>	Zambezi teak	NE	CR

Legend: IUCN status: DD (Data Deficient), LC (Least Concern), NT (Near Threatened), NE (Not-Evaluated), CR (Critically Endangered), L (Low), and M (Medium); Angolan Red List for Threatened Species (LVEA): NE (Not Evaluated), Vul (Vulnerable); Likelihood: L (Low), M (Medium).

It should be noted that although *Baikiaea plurijuga* (considered by IUCN to be Critically Endangered) was identified in the Project area of influence this species of medium-sized deciduous tree was not found within the right-of-way (within the 24 meters corridor) nor in the area for the expansion of the Arimba substation.

Leaving Arimba Substation and for the first five kilometres the distribution line follows the road and no vegetation is found in this route alignment. From km 5 and km 7 the distribution line covers bare land with no vegetation. Between km 7 and km 9 the distribution line crosses some agriculture fields and only in the last 500 m it encounters sparse vegetation. The most dense area in terms of vegetation is where the East Lubango substation will be erected and this is covered by another ESIA report focusing on the 220 kV Transmission Line.

4.1.8. Fauna

In this chapter we discuss the data referring to the faunal elements present in the study area, mainly resulting from bibliography research and ground visits. The main focus in this report is given to birds, with a briefer reference to Mammals, Reptiles and Amphibians. As a whole these constitute the faunal groups that are usually better known, more easily addressed and considered suitable to the desired environmental baseline, but birds remain the most important given local conditions, and especially more so considering the scope of the proposed project.

It should be noted that the area where this project is going to be implemented has undergone several landscape changes as result of the human modification which occurred in the past years with the construction of infrastructures, which includes roads, buildings and a 150 kV transmission line which runs almost in parallel to the proposed distribution line. As discussed below and due to the already developed and changed landscape the project area does not present significant fauna.

Birds

Introduction

Typically, birds are a critical faunal group to characterize in faunal surveys, firstly due to their high diversity and for being relatively common and many species are easy to record, secondly because birds are adequate for quantification and future monitoring, while they are also sensitive indicators of biological richness by fulfilling various key ecological roles in any given site. In addition, the published knowledge on birds tends to be much more detailed, updated and accessible than the correspondent for other faunal groups, and thus more easily comparable, which often includes data on threatened, migratory, rare and endemic taxa.

On the other hand, birds consist of the most vulnerable group and most likely to be directly affected by power lines, especially resulting from direct injuries and fatalities following flight collisions and/or electrocution. Although no studies have ever been performed in Angola looking into the risks posed by power lines to birds, there is extensive literature on the subject applied more globally, but particularly in South Africa, which can be applied to the present study (e.g. Jenkins et al. 2010; Smallie 2011). Such hazards, however, are not uniformly distributed across avian taxonomic groups, but rather tend to have a high incidence for some, while of little relevance for others (Smallie 2011). Specifically, large heavy-bodied species inhabiting open country (Jenkins et al. 2010)

Methodology

An effort was made to produce the most comprehensive bird list possible, even though part of the effort was desktop based, and the field work was somewhat limited. As a starting point we produced, based on available literature (e.g. Rosa Pinto 1983; Dean 2000) but also from non-published records and some online resources, a list that aggregates all avifaunal species that have been recorded or are expected to occur in Huíla Province. This list was further narrowed down to include only species confirmed on site or deemed possible to occur in the project area.

The ornithological survey, on the ground, were performed in the dry season, between 3rd – 4th August and 13th – 14th August 2021. These surveys were conducted by the census method to observe birds opportunistically.

The observations were conducted by one observer, including trekking routes particularly in early morning and late afternoons along the proposed route. Given the high deterioration of natural habitat of the site, we did most of the work using the existing roads which were driven slowly to allow recording of birds, often leading to stopping the car for proper identification.

For bird observations it was used a pair of binoculars Swarovski SLC 10X42, and when necessary we also resorted to a spotting scope Swarovski 80mm ATS HD on a Manfrotto tripod, useful to identify birds perched far away. Whenever possible birds were photographed with a Canon Eos 7D camera and Telephoto lens Canon EF 400mm f5.6L USM. To assist the bird identification, we used the few published field guides that include Angola (Sinclair and Ryan 2003), and various papers published which addressed local bird fauna (Rosa Pinto 1983; Mills 2007, 2010; Mills et al. 2010; Dean et al. 2019).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

In order to compile a more comprehensive bird list and compensate for limitations on the field surveys, we refer here bird species not recorded in this study, but expected to occur in the project area, as they have been confirmed in the city of Lubango or surrounds. These have been referred to as “P” (possible). Nevertheless, it is still difficult, to assess the likelihood of recording many species on the project site, and it is possible that species not considered may well be recorded in later surveys.

Results and Discussion

As a starting point, a total list of 510 bird species was produced for the whole province of Huíla, but of these we considered a shorter list of 103 species (see **Appendix 4**, List of Birds) that would be considered possible to occur. Finally, the team was able to record by confirming their presence on site, eighteen (18) bird species, of which five (5) were photographed (see **Figure 4-11**). The overall list is relatively well distributed across bird families but also very poor in diversity, which is not surprising given that the project is situated on an urban area and subjected to very high levels of environmental degradation.

In terms of bird families and within the non-passerine orders we recorded one swift (family Apodidae), two pigeons (family Columbiformes) and one bee-eater (family Meropidae). Among the passerines, we observed one shrike (family Laniidae), one crow (family Corvidae), one lark (family Alaudidae), two swallows (family Hirundinae), two cisticola-like (family Cisticolidae) and two starlings (family Sturnidae), one chat (family Muscicapidae), two sparrows (family Passeridae) and one waxbill (family Estrildidae). The species which were recorded (R) in the distribution line are indicated in **Table 4-8**.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Table 4-8: List of bird families in the Project Area.

SCIENTIFIC NAME	COMMON NAME	NOME COMUM	LVEA ¹	IUCN ²	ENDEMISM ³	SEASONALITY ⁴	RISK ⁵	PRESENCE ⁶
<i>Pternistis afer</i>	Red-necked Spurfowl	Francolim-de-gola-vermelha	NE	LC	WS	R	M	P
<i>Caprimulgus fossii</i>	Square-tailed Nightjar	Noitibó de Moçambique	NE	LC	WS	M	L	P
<i>Tachymarptis melba</i>	Alpine Swift	Andorinhão-real	NE	LC	WS	M	L	P
<i>Apus apus</i>	Common Swift	Andorinhão-preto-europeu	NE	LC	WS	R	L	P
<i>Apus bradfieldi</i>	Bradfield's Swift	Andorinhão de Bradfield	NE	LC	WS	R	L	P
<i>Apus affinis</i>	Little Swift	Andorinhão-pequeno	NE	LC	WS	R	L	R
<i>Centropus superciliosus</i>	White-browed Coucal	Cucal-de-sobrancelhas	NE	LC	WS	R	L	P
<i>Clamator jacobinus</i>	Jacobin Cuckoo	Cuco-jacobino	NE	LC	WS	M	L	P
<i>Chrysococcyx caprius</i>	Diederick Cuckoo	Cuco-bronzeado-maior	NE	LC	WS	M	L	P
<i>Columba livia</i>	Rock Dove	Pombo-doméstico	NE	LC	WS	R	M	R
<i>Streptopelia semitorquata</i>	Red-eyed Dove	Rola-de-olhos-vermelhos	NE	LC	WS	R	M	R
<i>Streptopelia capicola</i>	Ring-necked Dove	Rola do Cabo	NE	LC	WS	R	L	P
<i>Spilopelia senegalensis</i>	Laughing Dove	Rola do Senegal	NE	LC	WS	R	L	P
<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	Rola-esmeraldina	NE	LC	WS	R	L	P
<i>Bubulcus ibis</i>	Western Cattle Egret	Garça-boieira	NE	LC	WS	R	L	P
<i>Ardea cinerea</i>	Grey Heron	Garça-real	NE	LC	WS	R	M	P
<i>Ardea melanocephala</i>	Black-headed Heron	Garça-de-cabeça-preta	NE	LC	WS	R	M	P
<i>Scopus umbretta</i>	Hamerkop	Pássaro-martelo	NE	LC	WS	R	L	P
<i>Elanus caeruleus</i>	Black-winged Kite	Peneireiro-cinzento	NE	LC	WS	R	L	P
<i>Milvus aegyptius</i>	Yellow-billed Kite	Milhafre-preto-de-bico-amarelo	NE	LC	WS	R	M	P
<i>Buteo augur</i>	Augur Buzzard	Bútio-augur	NE	LC	WS	R	M	P
<i>Tyto alba</i>	Western Barn Owl	Coruja-das-torres	NE	LC	WS	R	L	P
<i>Colius castanotus</i>	Red-backed Mousebird	Rabo-de-junco de Angola	NE	LC	ES	R	L	P
<i>Urocolius indicus</i>	Red-faced Mousebird	Rabo de juncos se faces vermelhas	NE	LC	WS	R	L	P
<i>Upupa africana</i>	African Hoopoe	Poupa-africana	NE	LC	WS	R	L	P

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	NOME COMUM	LVEA ¹	IUCN ²	ENDEMISM ³	SEASONALITY ⁴	RISK ⁵	PRESENCE ⁶
<i>Coracias caudatus</i>	Lilac-breasted Roller	Rolieiro-de-peito-lilás	NE	LC	WS	R	L	P
<i>Halcyon chelicuti</i>	Striped Kingfisher	Pica-peixe-riscado	NE	LC	WS	R	L	P
<i>Halcyon senegalensis</i>	Woodland Kingfisher	Pica-peixe-dos-bosques	NE	LC	WS	R	L	P
<i>Merops hirundineus</i>	Swallow-tailed Bee-eater	Abelharuco-andorinha	NE	LC	WS	R	L	P
<i>Merops pusillus</i>	Little Bee-eater	Abelharuco-dourado	NE	LC	WS	M	L	R
<i>Merops superciliosus</i>	Olive Bee-eater	Abelharuco-oliváceo	NE	LC	WS	M	L	P
<i>Merops apiaster</i>	European Bee-eater	Abelharuco-europeu	NE	LC	WS	M	L	P
<i>Lybius torquatus</i>	Black-collared Barbet	Barbaças-de-colar-preto	NE	LC	WS	R	L	P
<i>Falco rupicolus</i>	Rock Kestrel	Peneireiro-vulgar-africano	NE	LC	WS	R	L	P
<i>Falco biarmicus</i>	Lanner Falcon	Alfaneque	NE	LC	WS	R	M	P
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	Republicano-de-faces-rosadas	NE	LC	NE	R	L	P
<i>Tchagra australis</i>	Brown-crowned Tchagra	Picanço-assobiador-de-coroa-castanha	NE	LC	WS	R	L	P
<i>Dryoscopus cubla</i>	Black-backed Puffback	Picanço-de-almofadinha-austral	NE	LC	WS	R	L	P
<i>Laniarius aethiopicus</i>	Tropical Boubou	Picanco tropical	NE	LC	WS	R	L	P
<i>Nilaus afer</i>	Brubru	Brubru	NE	LC	WS	R	L	P
<i>Prionops plumatus</i>	White-crested Helmetshrike	Atacador-branco	NE	LC	WS	R	L	P
<i>Lanius minor</i>	Lesser Grey Shrike	Picanço-cinzento-pequeno	NE	LC	WS	M	L	P
<i>Lanius humeralis</i>	Northern Fiscal	Picanço-fiscal-comum	NE	LC	WS	R	L	R
<i>Oriolus larvatus</i>	Black-headed Oriole	Papa-figos-de-cabeça-preta-oriental	NE	LC	WS	R	L	P
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	Drongo-de-cauda-forcada	NE	LC	WS	R	L	P
<i>Terpsiphone viridis</i>	African Paradise Flycatcher	Papa-moscas-do-paraíso-comum	NE	LC	WS	M	L	P
<i>Corvus capensis</i>	Cape Crow	Gralha do Cabo	NE	LC	WS	R	L	P
<i>Corvus albus</i>	Pied Crow	Corvo-seminarista	NE	LC	WS	R	L	R
<i>Mirafra africana</i>	Rufous-naped Lark	Cotovia-de-nuca-vermelha	NE	LC	WS	R	L	R
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	Brimblau-comum	NE	LC	WS	R	L	R
<i>Chlorocichla flaviventris</i>	Yellow-bellied Greenbul	Tuta-amarela	NE	LC	WS	R	L	P

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	NOME COMUM	LVEA ¹	IUCN ²	ENDEMISM ³	SEASONALITY ⁴	RISK ⁵	PRESENCE ⁶
<i>Psalidoprocne pristoptera</i>	Black Saw-wing	Andorinha-preta-comum	NE	LC	WS	M	L	P
<i>Pseudhirundo griseopyga</i>	Grey-rumped Swallow	Andorinha-d'uropígio-cinzento	NE	LC	WS	M	L	R
<i>Hirundo rustica</i>	Barn Swallow	Andorinha-das-chaminés	NE	LC	WS	M	L	P
<i>Hirundo angolensis</i>	Angola Swallow	Andorinha de Angola	NE	LC	WS	R	L	P
<i>Hirundo smithii</i>	Wire-tailed Swallow	Andorinha-cauda-de-arame	NE	LC	WS	R	L	P
<i>Ptyonoprogne fuligula</i>	Rock Martin	Andorinha-das-rochas-africana	NE	LC	WS	R	L	P
<i>Delichon urbicum</i>	Common House Martin	Andorinha-dos-beirais	NE	LC	WS	M	L	P
<i>Cecropis abyssinica</i>	Lesser Striped Swallow	Andorinha-estriada-pequena	NE	LC	WS	M	L	R
<i>Cecropis semirufa</i>	Red-breasted Swallow	Andorinha-de-peito-ruivo	NE	LC	WS	M	L	P
<i>Cecropis senegalensis</i>	Mosque Swallow	Andorinha-das-mesquitas	NE	LC	WS	M	L	P
<i>Sylvietta rufescens</i>	Long-billed Crombec	Rabicurta-de-bico-comprido	NE	LC	WS	R	L	P
<i>Phylloscopus trochilus</i>	Willow Warbler	Felosa-musical	NE	LC	WS	M	L	P
<i>Hippolais icterina</i>	Icterine Warbler	Felosa-icterina	NE	LC	WS	M	L	P
<i>Cisticola chiniana</i>	Rattling Cisticola	Fuinha-chocalheira	NE	LC	WS	R	L	R
<i>Cisticola fulvicapilla</i>	Neddicky	Fuinha-de-cabeça-ruiva	NE	LC	WS	R	L	P
<i>Prinia subflava</i>	Tawny-flanked Prinia	Prínia-de-flancos-castanhos	NE	LC	WS	R	L	R
<i>Cameroptera brevicaudata</i>	Grey-backed Cameroptera	Cameroptera-de-dorso-cinzento	NE	LC	WS	R	L	P
<i>Turdoides hartlaubii</i>	Hartlaub's Babbler	Zaragateiro de Hartlaub	NE	LC	WS	R	L	P
<i>Zosterops senegalensis</i>	African Yellow White-eye	Olho-branco-amarelo	NE	LC	WS	R	L	P
<i>Lamprotornis nitens</i>	Cape Starling	Estorninho do Cabo	NE	LC	WS	R	L	R
<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	Estorninho-de-dorso-violeta	NE	LC	WS	M	L	R
<i>Cossypha heuglini</i>	White-browed Robin-Chat	Cossifa de Heuglin	NE	LC	WS	R	L	P
<i>Erythropygia leucophrys</i>	White-browed Scrub Robin	Rouxinol-do-mato-estriado	NE	LC	WS	R	L	P
<i>Saxicola torquatus</i>	African Stonechat	Cartaxo-comum	NE	LC	WS	R	L	R
<i>Oenanthe familiaris</i>	Familiar Chat	Chasco-familiar	NE	LC	WS	R	L	P
<i>Myrmecocichla nigra</i>	Sooty Chat	Chasco-formigueiro-preto	NE	LC	WS	R	L	P

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	NOME COMUM	LVEA ¹	IUCN ²	ENDEMISM ³	SEASONALITY ⁴	RISK ⁵	PRESENCE ⁶
<i>Muscicapa striata</i>	Spotted Flycatcher	Papa-moscas-cinzento	NE	LC	WS	M	L	P
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	Beija-flor-preto	NE	LC	WS	R	L	P
<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	Beija-flor-de-peito-escarlata	NE	LC	WS	R	L	P
<i>Cinnyris talatala</i>	White-bellied Sunbird	Beija-flor-de-barriga-branca	NE	LC	WS	R	L	P
<i>Cinnyris venustus</i>	Variable Sunbird	Beija-flor-de-barriga-amarela	NE	LC	WS	R	L	P
<i>Cinnyris cupreus</i>	Copper Sunbird	Beija-flor-cobreado	NE	LC	WS	R	L	P
<i>Passer domesticus</i>	House Sparrow	Pardal-dos-telhados	NE	LC	WS	R	L	R
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	Pardal-de-cabeça-cinzenta-meridional	NE	LC	WS	R	L	R
<i>Ploceus ocularis</i>	Spectacled Weaver	Tecelão-de-lunetas	NE	LC	WS	R	L	P
<i>Ploceus xanthops</i>	Holub's Golden Weaver	Tecelão-dourado	NE	LC	WS	R	L	P
<i>Ploceus velatus</i>	Southern Masked Weaver	Tecelão-de-máscara	NE	LC	WS	R	L	P
<i>Ploceus cucullatus</i>	Village Weaver	Tecelão-malhado	NE	LC	WS	R	L	P
<i>Quelea quelea</i>	Red-billed Quelea	Quelea-de-bico-vermelho	NE	LC	WS	R	L	P
<i>Euplectes orix</i>	Southern Red Bishop	Bispo de testa preta	NE	LC	WS	R	L	P
<i>Pytilia melba</i>	Green-winged Pytilia	Maracachão-d'asa-verde	NE	LC	WS	R	L	P
<i>Lagonosticta senegala</i>	Red-billed Firefinch	Peito-de-fogo-de-bico-vermelho	NE	LC	WS	R	L	P
<i>Uraeginthus angolensis</i>	Blue Waxbill	Peito-celeste	NE	LC	WS	R	L	R
<i>Estrilda astrild</i>	Common Waxbill	Bico-de-lacre-comum	NE	LC	WS	R	L	P
<i>Lonchura cucullata</i>	Bronze Mannikin	Freirinha-bronzeada	NE	LC	WS	R	L	P
<i>Vidua chalybeata</i>	Village Indigobird	Viúva-azul	NE	LC	WS	R	L	P
<i>Vidua purpurascens</i>	Purple Indigobird	Viúva-púrpura	NE	LC	WS	R	L	P
<i>Vidua macroura</i>	Pin-tailed Whydah	Viuvinha	NE	LC	WS	R	L	P
<i>Motacilla capensis</i>	Cape Wagtail	Alvéola do Cabo	NE	LC	WS	R	L	P
<i>Anthus leucophrys</i>	Plain-backed Pipit	Petinha-de-dorso-liso	NE	LC	WS	R	L	P
<i>Serinus flavivertex</i>	Yellow-crowned Canary	Canário-amarelo-das-montanhas	NE	LC	WS	R	L	P
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	Escrevedeira-das-pedras	NE	LC	WS	R	L	P

Legend:

1 **(LVEA)**: Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 **(IUCN)**: LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

3 **(ENDEMISM)**: WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 **(SEASONALITY)**: R - Resident; M - Migratory

5 **(RISK)**: H - High; M - Medium; L - Low

6 **(PRESENCE)**: R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

In general, birds were few and sparsely distributed, with the most common species, or at least the ones more frequently recorded (in every day of survey) were the fiscal shrike (*Lanius collaris*), the pied crow (*Corvus albus*) and the two species of sparrows (*Passer domesticus*; *Passer griseus*). In addition, most species recorded were generalist, and all are widespread and quite adaptable and tolerant of disturbance and habitat transformation.

Potentially Affected Bird Species

Birds of Prey

Diurnal birds of prey are predatory species that occupy higher positions in the trophic pyramid, and for this reason they are typically less abundant in number and more vulnerable to environmental impacts. In addition, they can be highly specialized to particular niches and are excellent natural indicators. In addition, the large size of some of these birds makes them often vulnerable to power lines, and also for this reason they should be especially considered.

We recorded no birds of prey along the route during our survey, which is not surprising given the significant level of local fragmentation or loss of habitat in urban area.

Aquatic Birds

In this project route there is no permanent or relevant water body, and only a small, mostly dry, drainage line, was identified near the easternmost section, but with no potential to harbour or attract aquatic birds. This situation does not change even during the rainy season. Only one inland lake, Ivantala Lake, is present some 5 kms north of the substation of East Lubango, but it is sufficiently far as for the aquatic birds present not be considered as affected by this power line. As expected, we did not record any aquatic bird during our survey.

Migratory species

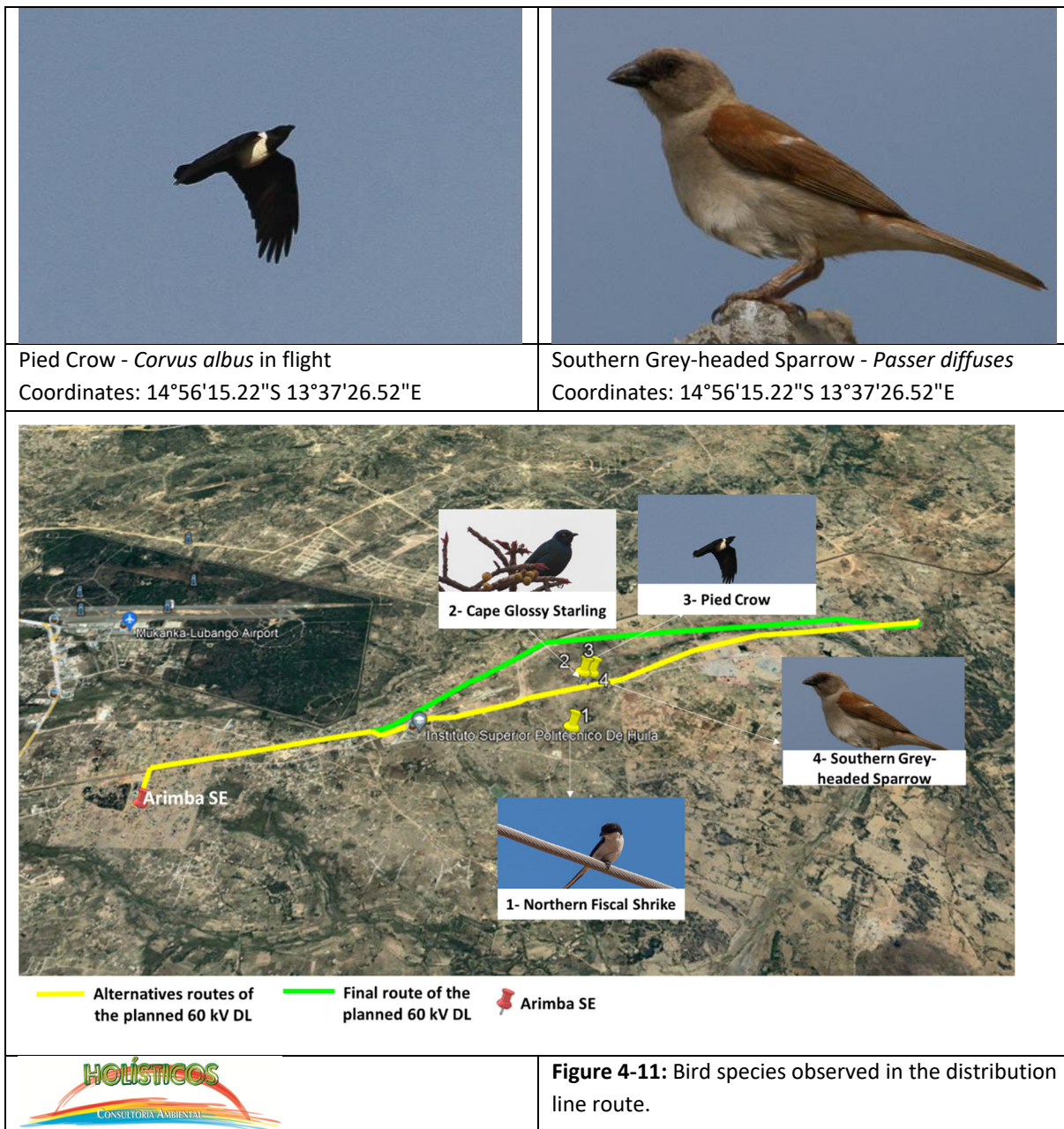
No migratory species have been recorded in the Project area of influence and no records of collision with the existing 150 kV transmission line have been sighted or referred by the local communities and authorities.



Northern Fiscal Shrike - *Lanius humeralis*
Coordinates: 14°56'45.00"S 13°37'18.46"E



Cape Glossy Starling - *Lamprotornis nitens*
Coordinates: 14°56'15.04"S 13°37'23.13"E



Mammals

Introduction

Mammals constitute generally one of the most important faunistic groups to report in biological inventories, given its high diversity, adaptation to a large array of habitats, and the complex relationships, often conflicting, that are established with human populations. The fact that many mammals are routinely hunted and killed, makes some of these species highly vulnerable to **population decrease**. It is not expected for the proposed distribution line to have a significant negative effect on local mammal populations, particularly due to the fact that the proposed project is located in an area severely disturbed by huma activity.

Methodology

The mammal species list (see **Appendix 5** Mammals List) here produced results primarily from records obtained during the preliminary survey but, in order to try to present a list as comprehensive as possible, we added a lot of desktop-based data. Most of the entries on the list are based on available literature (e.g. Hill & Carter 1944; Crawford-Cabral & Veríssimo 2005; Kingdon et al. 2013; Beja et al. 2019) and on a few non-published records, resulting in a final list that aggregates all mammal species that have been recorded or are expected to occur in the whole Huíla Province. In addition, we tried to identify species that can be considered as “L” (likely) or “P” (possible) to occur along the route, while the rest were deemed as unlikely to be present. However, some mammal species were listed as unlikely to be recorded mostly because there is simply not enough information available, thus making it really hard to assess their likelihood, or in other cases because also of low intrinsic detectability as in the case of Chiroptera and rodents.

The mammal survey, on the ground, were performed in the dry season, between 3rd – 4th August and 13th – 14th August 2021. These surveys were conducted opportunistically rather than adopting a systematic methodology.

Results and Discussion

From the site visits, informal interviews and stakeholder meetings no mammals have been identified along or in the close proximity of the proposed route of the distribution line. Similarly, no species of mammals have been sighted in and around the Arimba Substation.

Amphibians

Introduction

Among the various vertebrate groups typically assessed during faunal inventories, amphibians are also considered important to assess, particularly as they are established as excellent bio-indicators. This results from the fact that most species depend on very specific habitat requirements and have a permeable skin that easily absorb any sort of toxic substance. These traits make amphibians very susceptible to environmental **degradation of habitat**, and therefore good indicators for environmental stress. The health of a given frog community can be seen as indicative of the health of the local biosphere. However, it should be noted that the proposed distribution line does not cross any habitats relevant for amphibians thus the team did not expect to find any amphibians.

Methodology

In the absence of reliable and updated information for the region where the distribution line route is located, and to be established a base line for this study, we produce an original species list extended to the whole of Huíla province, containing both old and recent, confirmed in literature (Bocage 1895; Marques et al. 2016; Conradie et al. 2019) and unpublished records. The team made an effort to flag species that can be considered as “L” (likely) or “P” (possible) to occur along the route, but most of the species listed for Huíla province were deemed as unlikely to be present due to lack of appropriate habitat.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The amphibian survey, on the ground, were performed in the dry season, between 3rd – 4th August and 13th – 14th August 2021. These surveys were conducted opportunistically rather than adopting a systematic methodology.

Baseline information stems from published literature (Bocage 1895, Schiotez 1999, Carruthers 2001, Channing 2001, Du Preez 2011; Marques et al. 2018; Channing & Rodel 2019) but we also make use of recent research that has been published on Angolan amphibians, but also some data from works in progress.

Results and Discussion

From the site visits, informal interviews and stakeholder meetings no amphibians have been identified along or in the close proximity of the proposed route of the distribution line. The fact that there are not habitats for amphibians in the Project area of influence and the close proximity to an urban setting contributed to these results.

Reptiles

Introduction

A faunistic group usually important for environmental studies are the Reptiles, as they occupy crucial niches in most ecosystems, with many species playing various roles in the food chains, often both as predator and prey. Reptiles are also usually relatively common in most regions, and tend to be highly speciose, meaning that slight changes in habitats followed by geographic isolation, leads frequently to the evolution of new taxa, thus reptile lists contribute with a high informative power to faunal inventories.

It should be noted that it is not expected for the proposed distribution line to have a significant negative effect on the reptile populations, other than occasionally some local habitat destruction which is already very disturbed and poor.




Methodology

The team relied extensively on available information produced for the region where the study area is located, either from literature (e.g., Bocage 1895; Ceríaco et al. 2016; Marques et al. 2018; Butler et al. 2019; Branch et al. 2019) or unpublished data and online resources, and produced a comprehensive original list aggregating all previously known and recorded reptile species for Huíla province, which is set as a base line. In addition, we tried to identify species that can be considered as “L” (likely) or “P” (possible) to occur along the route, while the rest were deemed as unlikely to be present. The reptile survey, on the ground, were performed in the dry season, between 3rd – 4th August and 13th – 14th August 2021. These surveys were conducted opportunistically rather than adopting a systematic methodology. The reason for discarding methodologies such as transects or point counts was due to the relatively extensive route area to survey and the need to spend relatively little time in the various sites, coupled with high local **habitat fragmentation or loss**. Whenever possible reptiles were observed, identified and would be photographed in the wild.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Results and Discussion

A preliminary list for Huíla province indicated the existence of 95 reptile species, of which nine species were considered as possible or likely to occur along the route, but only one species was confirmed and photographed (**Figure 4-12**). It must be stressed that several snake species might indeed be present but their cryptic nature and lack of baseline data makes it very hard to evaluate, particularly due to the close proximity to an urban and degraded setting.

	
<p>Male of Schack's Agama - <i>Agama schacki</i> Coordinates: 14°56'23.93"S 13°37'18.46"E IUCN Status: Least Concern (LC); LVEA Status: Not Assessed.</p>	<p>Female of Schack's Agama - <i>Agama schacki</i> Coordinates: 14°56'23.93"S 13°37'18.46"E IUCN Status: Least Concern (LC); LVEA Status: Not Assessed.</p>
	
<p>Common tiger snake - <i>Telescopus semiannulatus</i> - Coordinates: 14°55'35.07"S 13°39'44.77"E IUCN Status: Least Concern (LC); LVEA Status: Not Assessed.</p>	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

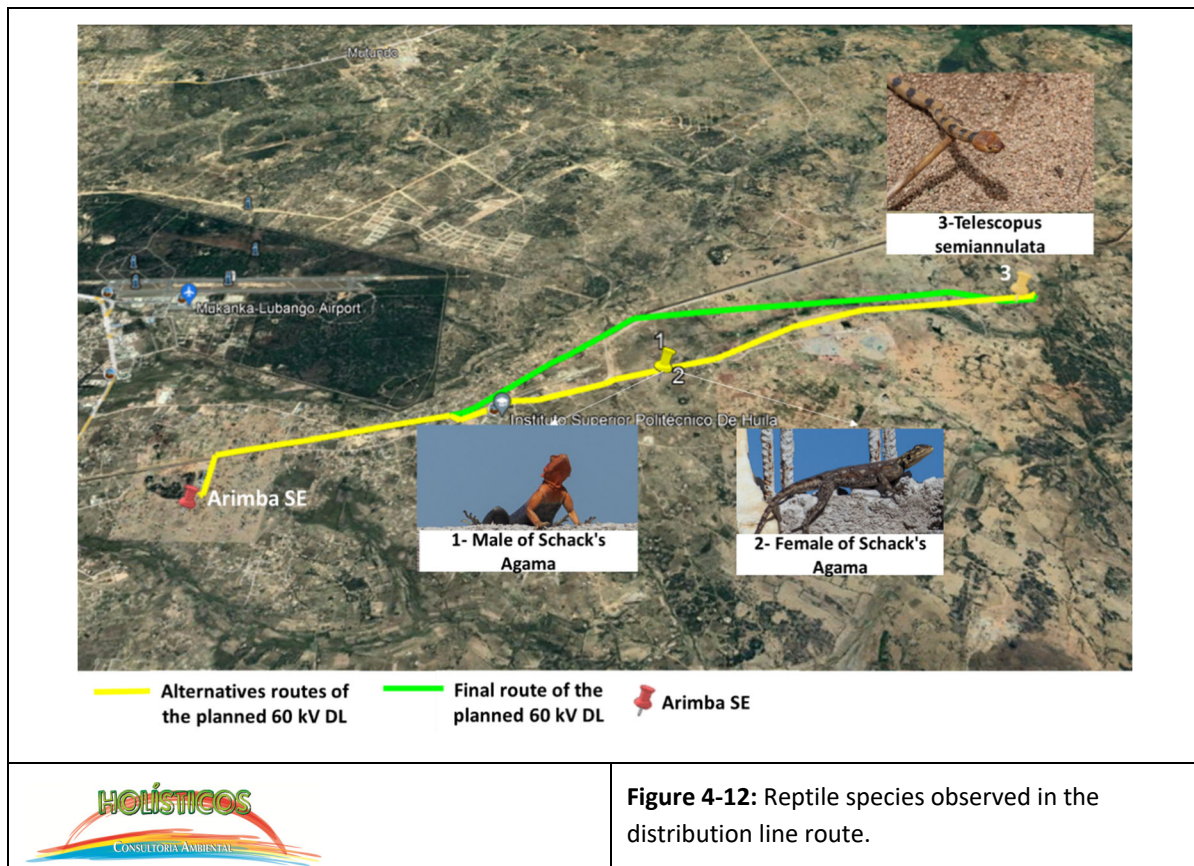


Figure 4-12: Reptile species observed in the distribution line route.

The only confirmed reptile species was Schack’s Rock Agama (*Agama schacki*). This agama is an endemic species, but quite common and widespread across the Angolan plateau, and proved to be abundant along the proposed project route. This species is also highly adaptable, often thriving in urban environments, as it makes use of human constructions for shelter, and establishes territories along houses, walls, debris, etc.

Even though the agama is an endemic species, and two additional lizards suggested as possible or likely to be present are also endemic species, in all cases these are common, widespread and well adapted to urban settings and should not be impacted by the power line. Moreover, there are no reptile species that we can consider of high risk in terms of being directly affected by the power line. The only factor that may be of relevance for reptiles is the possibility of habitat degradation locally, but this is not a relevant factor in the route area.

4.1.9. Environmental Landscape

The photolog below (**Figure 4-13**) illustrates the landscape environment around the Arimba substation and along the distribution line from Arimba Substation to the site for the construction of the East Lubango Substation.









As can be seen from Photos 1 and 2 the area planned for the expansion of Arimba Substation is free of any vegetation and infrastructure. Photos 3 and 4 show the area outside the Arimba Substation

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

showing evidence of lack of vegetation and any other sensitive landscape. Photos 5 and 6 illustrate some of the existing vegetation but outside the corridor which composed mostly of sparse shrubs and isolated trees. Photo 7 provides details on the road where the distribution line will run parallel to. Photos 11 to 14 show the landscape environment with the existing 150 kV line as well as sparse vegetation. Photos 15 to 16 are closer to the East Lubango Substation and show also some sparse vegetation as well as some cattle grazing in the area. On overall, the landscape is quite disturbed by human activities and with very low ecological value.



Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

	
<p>Photo 7: View of the DL route (III).</p>	<p>Photo 8: View of the DL route (IV).</p>
	
<p>Photo 9: View of the DL route (V).</p>	<p>Photo 10: View of the DL route (VI).</p>
	
<p>Photo 11: View of the DL route (VII).</p>	<p>Photo 12: View of the DL route (VIII).</p>
	
<p>Photo 13: View of the DL route (IX).</p>	<p>Photo 14: View of the DL route (X).</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

<p>Photo 15: View of the DL route (XI).</p>	<p>Photo 16: View of the DL route (XII).</p>
	<p>Figure 4-13: Environment around the Arimba substation and distribution line.</p>

4.1.10. Environmental Conservation Areas

Angola is a party to the Convention on Biological Diversity, the World Heritage Convention, the Convention to Combat Desertification and the Convention on Climate Change, and is a member of the FAO Plant Genetic Resources Commission. Of the 14 protected areas recognized by the Angolan legislation (see **Figure 4-14**), any area is located in the vicinity of the proposed Project route and surroundings. Bicuar National Park is located quite far from the DL route (about 120 km from Lubango). Therefore, are no formally designated protected areas affected by the proposed Project.

On the other hand, one area which has been proposed to the Government for future inclusion in the conservation area network, to the Ministry of Culture, Tourism and Environment, is Tundavala Gorge in Huíla province. The area in and around Tundavala has been highlighted as important in terms of geological, biological and cultural aspects. Tundavala was proposed by Huntley & Matos (1994) as a Nature Reserve, and it is mentioned in the Angolan National Biodiversity Strategy and Action Plan (NBSAP 2020) as a protected area for future proclamation. Tundavala Gorge is also classified as Important Bird Area (IBA, Birdlife International 2017), due to its diversity of species and its particularity for habitat-specific species.

Among the 23 Important Bird and Biodiversity and Areas (IBAs) which have been recognized for Angola (see figures below from Birdlife.org), covering 73,850 Km², equivalent to 5.9% of the land-surface area of the country, being one of them (IBA AO023 Tundavala) in Huíla (see **Table 4-9**), located far from the Project area of insertion and not be affected by the DL Project. In addition to the IBAs, there are also Key Biodiversity Areas (KBAs) which are the most important places in the world for species and their habitats. In the Huíla province there is the Tundavala KBA which lies about 15 km north-west of the town of Lubango and thus is not affected by the DL Project.

Table 4-9 and **Figure 4-15** show the Angolan IBAs and their respective location, including IBA AO023 Tundavala. No population data are available for any bird species in Angola and the importance of sites is judged entirely on the occurrence of species at particular sites.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

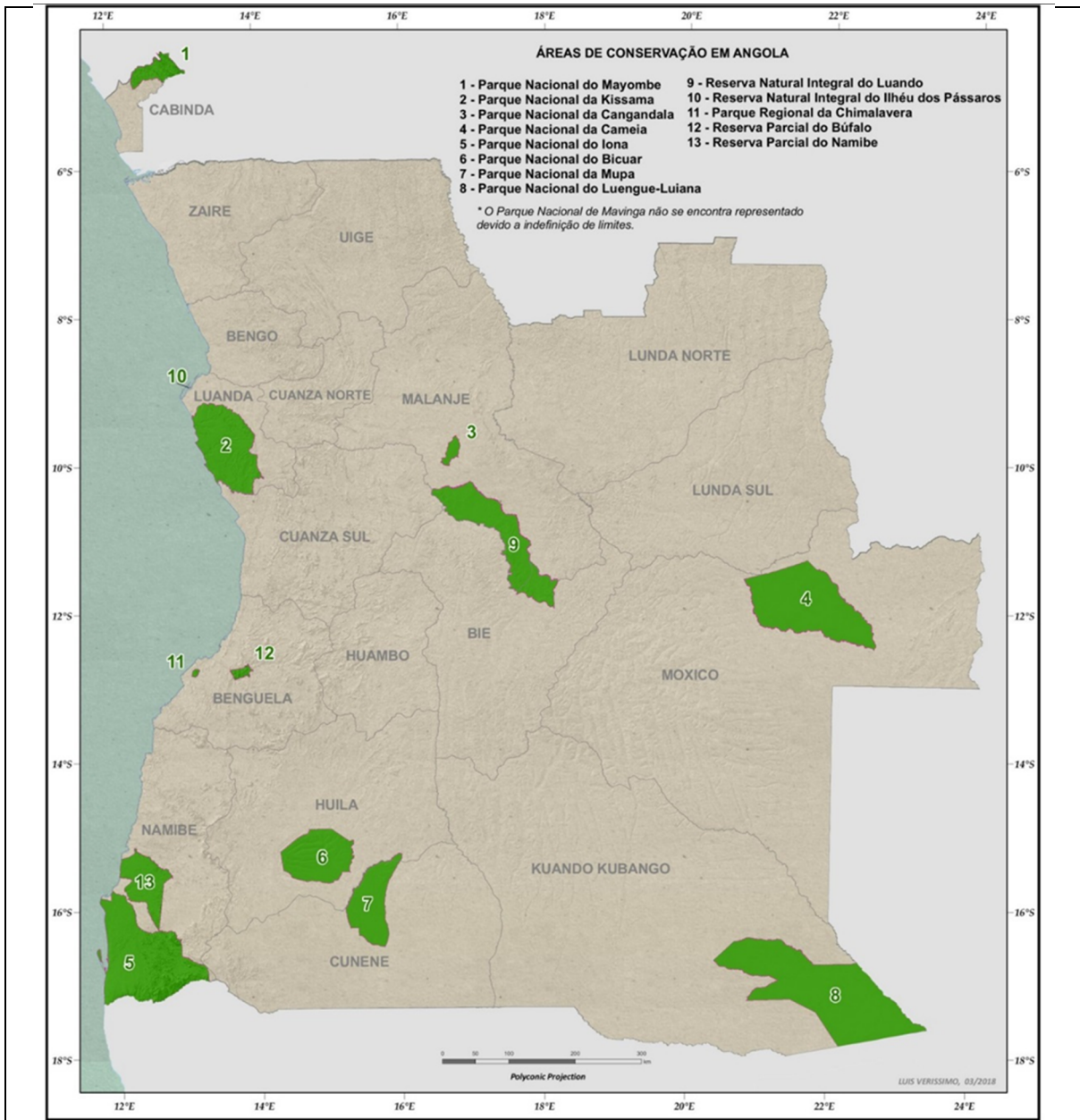
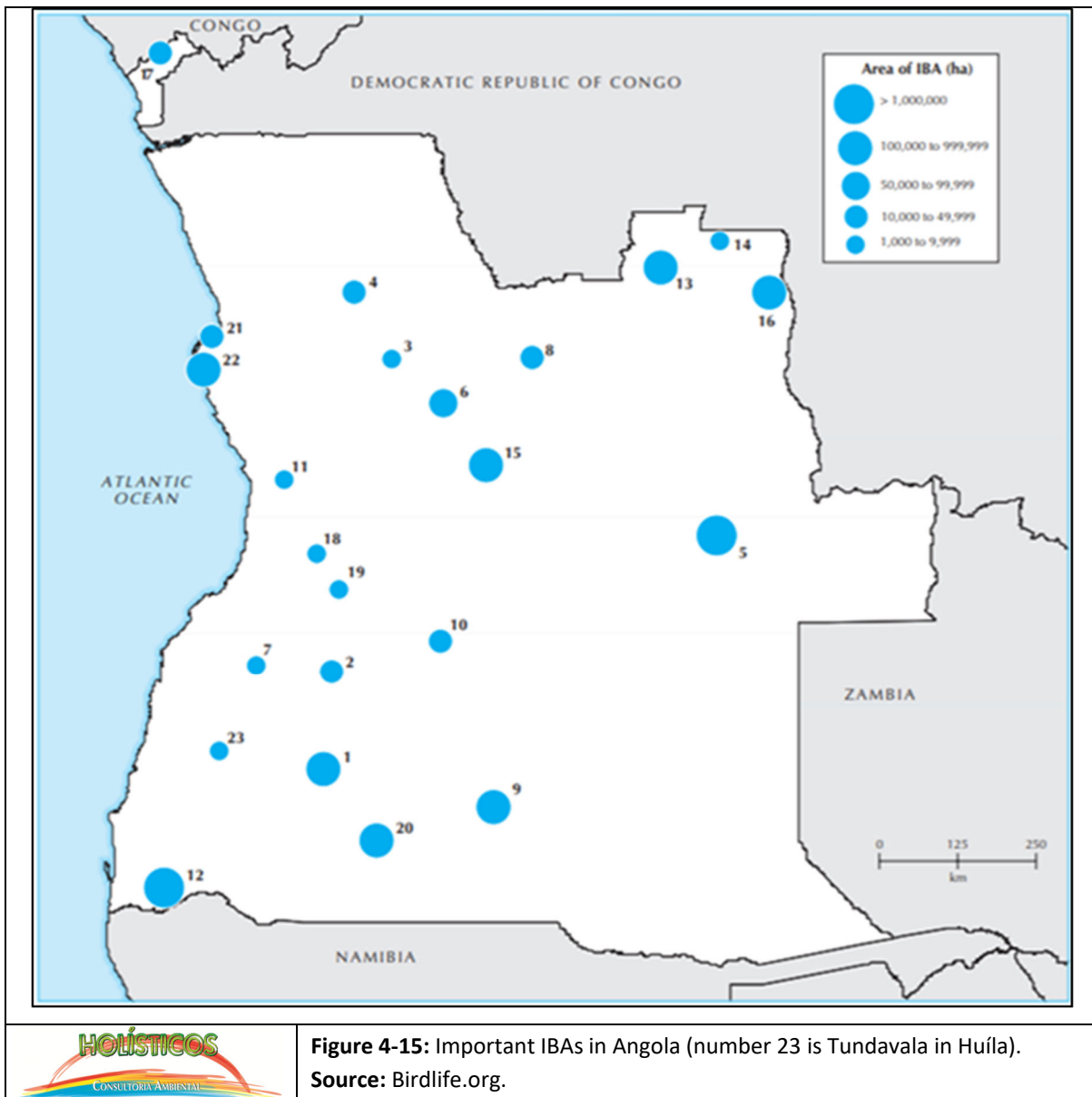


Figure 4-14 Environmental Conservation Areas in Angola and their location.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Out of the 23 Important Bird and Biodiversity Areas (IBAs) only three are located in the Huíla Province and the closest to the distribution line is Tundavala (AO023). **Table 4-9** shows the location of the IBAs and their classification criteria and code.

Table 4-9: Angolan IBAs and respective classification criteria.

No.	IBA Name	IBA code	Criteria	GPS coordinates	Region
1	Bicuar National Park	A0001	A3	-15.13 14.93	Huíla
2	Caconda	A0002	A3	-13.73 15.06	Huíla
3	Calandula	A0003	A1,A2,A3	-9.1 15.95	Malanje
4	Camabatela	A0004	A1,A2,A3	-8.18 15.83	Cuanza-Norte
5	Cameia National Park	A0005	A3	-11.72 20.8	Moxico
6	Cangandala National Park	A0006	A3	-9.78 16.68	Malanje

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No.	IBA Name	IBA code	Criteria	GPS coordinates	Region
7	Chongoroi	AO007	A1,A2,A3	-13.56 13.95	Benguela
8	Cuango	AO008	A3	-9.13 18.05	Lunda Norte
9	Cueleí	AO009	A1,A3	-15.71 17.45	Cuando Cubango
10	Cutato	AO010	A3	-13.21 16.51	Huambo, Huíla, Bié
11	Gabela	AO011	A1,A2,A3	-13.56 13.95	Cuanza-Sul
12	Iona National Park	AO012	A1,A2,A3	-16.91 12.58	Namibe
13	Lagoa do Carumbo	AO013	A1,A3	-7.81 19.95	Lunda-Norte
14	Luachimo river	AO014	A3	-9.78 16.68	Lunda-Norte
15	Luando strict Nature Reserve	AO015	A1,A2	-7.36 20.83	Malanje
16	Luia	AO016	A3	-8.16 21.55	Lunda-Norte
17	Maiombe	AO017	A3	-4.66 12.51	Cabinda
18	Mombolo	AO018	A1,A2,A3	-11.92 14.85	Cuanza-Sul
19	Mount Moco	AO019	A1,A2,A3	-12.41 15.18	Huambo
20	Mupa National Park	AO020	A1,A3	-16.18 15.75	Cunene
21	Mussulo	AO021	A1	-9.31 13.15	Luanda
22	Quiçama	AO022	A1,A2,A3	-9.31 13.15	Bengo
23	Tundavala	AO023	A1,A2,A3	-14.83 13.41	Huíla

Source: Important Bird and Biodiversity Areas in Africa and associated islands – Angola.

Note: **A1:** Globally threatened species; **A2:** Restricted range species; **A3:** Biome restricted species.

The IBA AO023 Tundavala sites lies about 15 km north-west of the town of Lubango. Apart from the spectacular scenery, with sheer cliff-faces hundreds of metres high, the area includes patches of relict Afromontane forest in a mosaic of undifferentiated montane communities. Patches of *Podocarpus milanjensis* occur in deep humid ravines and at altitudes above 1800 m (Huntley and Matos, 1994), and there is open *Protea* savanna and montane grasslands, quartzite formations and bracken *Pteridium* on the top of the escarpment, thickets along streams, poorly drained grassy patches in valleys, and dry woodlands at the bottom of the altitudinal gradient, providing a large range of bird habitats within a relatively small area.

Tree genera include *Podocarpus*, *Pittosporum*, *Olea* and *Ilex* on the higher elevations, with such species as *Adansonia digitata* and *Acacia welwitschii* at the bottom of the escarpment. There are small patches of miombo woodland (dominated by *Brachystegia* and *Julbernardia*) on sands on the plateau at the top of the escarpment.

Because of its proximity to Lubango and the bird and small-mammal collections at the former IICA, the IBA AO023 has been relatively well studied (in terms of species occurrence), but poorly studied in terms of the biology of the species that occur there. Among species of global conservation concern, *Xenocopsychus ansorgei* is common on rocky outcrops, *Estrilda thomensis* is frequent to locally common in dry woodlands below the escarpment, and *Francolinus swierstrai* probably occurs on the top of the escarpment (Pinto, 1983), but no specimens have been collected. Two other restricted-range species, *Dioptrornis brunneus* and *Nectarinia ludovicensis*, are both common in the area, and probably breed (Huntley and Matos, 1994).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Several poorly known species occur, including *Bradypterus lopezi* (Pinto, 1970) and *Apalis cinerea* in higher altitude forest patches. There are a number of species, including *Apus bradfieldi* and *Apalis flavida* that are restricted to dry woodlands at the bottom of the escarpment. Other species of interest include *Falco peregrinus*, *Lybius leucocephalus*, *Anthus lineiventris*, *Myrmecocichla nigra* and *Monticola brevipes* (one of the few sites in Angola where this species occurs). Two species of the Kalahari–Highveld biome have been recorded at this site, as has one species of the Guinea–Congo Forests biome (Huntley and Matos, 1994).

Clearing of woodland (using fire) for subsistence agriculture at the bottom of the escarpment still being done, the forests in the steep ravines are unlikely to be cleared, but the avifauna of the forest patches may be threatened by hunting (with dogs) and by runaway fires. No information is available on the mammal fauna.

There are also no wetlands declared as Ramsar Sites in the Project's area of influence. Angola acceded to the Convention on Wetlands of National Importance by Resolution No. 27/16 of July 22nd and in its accession process Angola proposed a set of 11 wetlands (MINAMB, 2018) to be considered as candidates for sites Ramsar. However, none of them are in the Project's area of influence or near the proposed DL route. The proposed Ramsar sites are listed below in **Table 4-10**.

Table 4-10: Proposed Ramsar sites in Angola.

No.	Proposed Ramsar Site	Area (hectares)	Ramsar Criteria	GPS Coordinates	Location (Province)
1.	Lagunas do Mangal do Lobito	259	1-3-8	12° 21' 45''S 13° 32' 43''E	Lobito (Benguela)
2.	Saco dos Flamingos	1616	2-3-4-8	9° 05' 03''S 13° 00' 15''E	Ramiro (Luanda)
3.	Lagoa do Arco	7568	1-3	15° 46' 01''S 12° 03' 47''E	Tômbwa (Namibe)
4.	Parque Nacional da Cameia	1 445 000	1-2-3	11° 57' 32''S 21° 40' 31''E	Cameia (Moxic)
5.	Complexo das Zonas Húmidas da Lagoa do Carumbo	200 000	2-3	7° 48'S 19° 57'E	Lunda-Norte
6.	Lagoa do Calumbo	1000	2-3	9° 10' 07''S 13° 24' 43''E	Icolo e Bengo (Luanda)
7.	Lagoa da Quilunda	5111	2-8	8° 53' 05''S 13° 36' 01''E	Icolo e Bengo (Luanda)
8.	Complexo de Lagunas de Santiago-Saurico	3763	2-4	8° 43' 37''S 13° 24' 49''E	Panguila (Bengo)
9.	Lagoa do Mangal do Chiloango	3097	1-3-4	5° 10' 37''S 12° 07' 35''E	Cacongo (Cabinda)
10.	Baixo Kwanza	97 200	2-3	9° 20' 45''S 13° 09' 04''E	Luanda
11.	Complexo das Zonas Húmidas de Kumbilo-Dirico	11 743	2-3	17° 59' 18''S 20° 46' 53''E	Dirico (Cuando Cubango)

4.2. Socioeconomic Baseline

This section presents the social, economic and cultural profile of the provinces of Huíla, including the constraints on the route design of the distribution line Project from a social, economic and cultural point of view.

4.2.1. Huíla Province Profile

The Political and Administrative Division (DPA) of Angola has 3 hierarchically ordered levels of disaggregation: Province, Municipality, and Commune or District. The provinces are divided into smaller territorial units that are the municipalities, which in turn are divided into smaller areas that are the communes or districts. Administratively Angola is divided into 18 provinces, and 162 municipalities. The municipalities are further divided into 559 communes (townships).

Huíla is a province of Angola, with a geographical area of 79,022 km². The province of Huíla is administratively divided into 14 municipalities, namely: Caconda, Cacula, Caluquembe, Chiange, Chibia, Chicomba, Chipindo, Cuvango, Humpata, Jamba, Lubango, Matala, Quilengues e Quipungo, 54 communes, 112 neighbourhoods in urban areas and 3,318 villages (in rural areas). Huíla has a high agricultural, industrial and tourist potential that can give it a decisive role in the development of Angola, having recently been pointed out as a potential region of attraction of cadres and development, and can help to decompress the province of Luanda. Capital-intensive agriculture, whether in irrigation or dry land perimeter, is in excellent condition in Huíla, and this province can become a barn for the constitution of the country's food reserves.

4.2.2. Demography

Population is the primary element in any country. It is upon the population that the concerns of the government fall, i.e., knowing the size of the population, its location, composition, welfare needs, etc. The General Census of Population and Housing conducted from 16th to 31st May, 2014, abbreviated referred to as "RGPH 2014" or "Census 2014," was the first in the 38 years of Angola Independence. According to Census 2014, the resident population of Huíla province is estimated in approximately 2,497,422 inhabitants, and 32.2% reside in the urban area and about 67.3% in the rural area (INE, 2016) (see **Table 4-11**). The population density in Huíla province is about 33 people per square kilometres. The Lubango municipality has the highest population density of the province with 279 inhabitants per square kilometres, about 8 times higher than the province average. Arimba community has an estimated population of approximately 1,060,169 inhabitants (509,802 males and 550,367 females) (INE, 2016).

Table 4-11: Resident population by area of residence, considering gender.

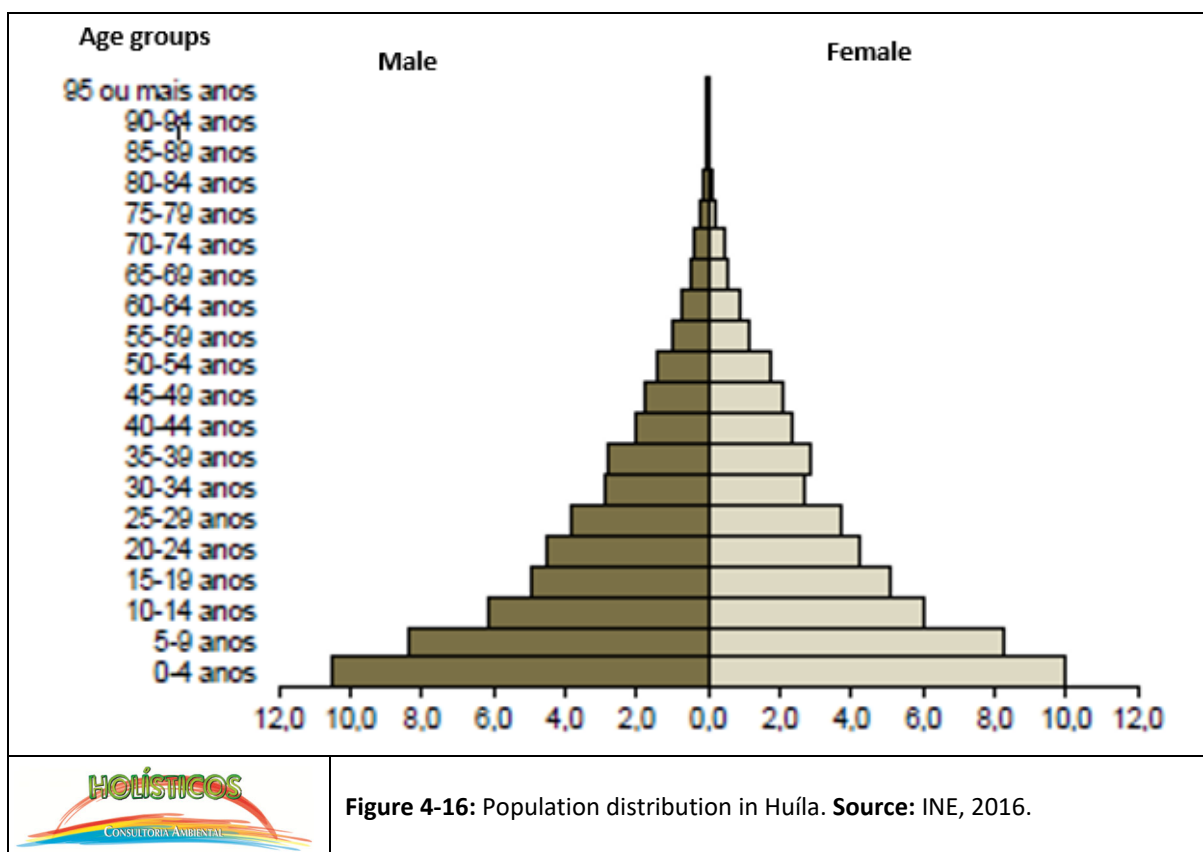
Province, municipality and commune	Total		
	Total	Men	Women
Huíla	2,497,422	1,186,589	1,310,833
Lubango	776,249	373,465	402,784

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Province, municipality and commune	Total		
	Total	Men	Women
Arimba	46,084	22,206	23,878
Urban Area	817,039	390,816	426,223
Rural Area	1,680,383	795,773	884,610

Source: INE, 2016.

The Lubango municipality is the most populous with 776,249 people, representing about a third (31%) of the population of the province. With less than 100,000 each appear the municipalities of Humpata (89,144), Gambos (79,462), Cuvango (78,543), Quilengues (75,334) and Chipindo (64,714). The age structure of the resident population in 2014 shows marked differences between age groups. Profiled by a wide base of the pyramid, which corresponds to the younger population and a top of the narrow pyramid representing the older population (see **Figure 4-16**).



The Portuguese is spoken by more than half of the population (54%) with higher predominance in the urban area, where 85% of the population speaks the Portuguese language, while in the rural area are 39%. Umbundu is the second most spoken language with 32%, followed by Nyaneka-Humbi and Muhumbi with about 24% and 11%, respectively (INE, 2016).

4.2.3. Electricity and Water Distribution

Energy consumption plays a central role in the sustainable development of a country, in its social (fight against poverty), economic (security of supply), and environmental (environmental protection) dimensions. The accelerated process of urbanization leads to a growing supply of electrical energy, through models based on increasing supply to meet an equally growing demand. The consumption of electricity has, therefore, an expressive participation of the residential segment due to population growth. Between 2001 and 2009 access to grid electricity almost doubled in the country (INE, 2016).

According to the 2014 Census results, only 16% of Huíla households have access to electricity from the public grid (INE, 2016), as shown in **Figure 4-17** the percentage of households supplied by the national electricity distribution network in the country and other means of illumination used to make up for the shortage of energy. In the Huila Province only 16,0% of residences are connected to the public electricity distribution network. As a result of this almost 84% of the province's households use, private generators, oil lamps, candles, battery lanterns and wood. According to the 2014 Census results, only 16% of Huíla households have access to electricity from the public grid (INE, 2016), as shown in **Figure 4-17**. According to the Provincial Directorate of Energy and Water (DPEA), in the province of Huila the main sources of electricity production are: the Matala Hydroelectric Dam, with three (3) turbines of 13.6 MW each, for a total of 40.8 MW; the Arimba Thermal Power Plant, with 28 generator sets, for a total of 40 MW; and the Thermal Power Plant attached to the electrical substation of Lubango, with eleven (11) generator sets for a total of 40 MW. These sources of production ensure the supply of electricity to the municipalities of Lubango, Humpata, Chibia, Matala and Quilengues (DPEA, 2015).

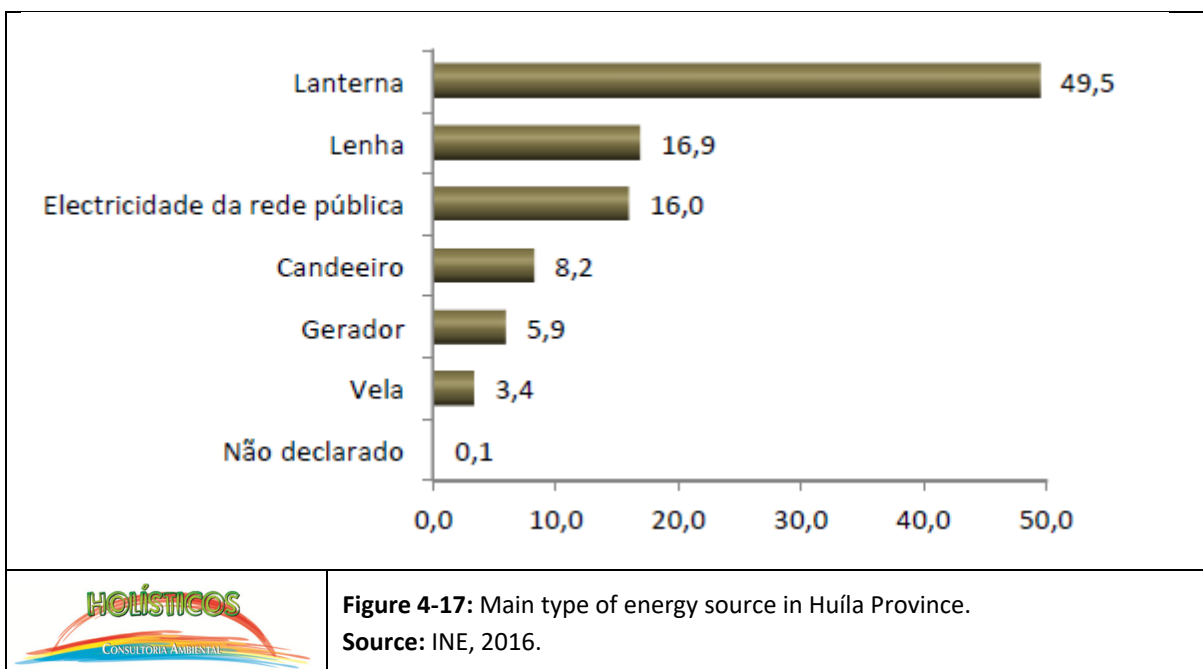


Figure 4-17: Main type of energy source in Huíla Province.
Source: INE, 2016.

At the level of municipalities further away from the electricity production points and in rural areas, the electricity supply is guaranteed with the use of generator sets with variable power from 20 to 1,000 kVA, working only 5 hours a day, and small photovoltaic plants with capacities of 5 kVA (DPEA, 2015).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The major urban centres in the province have overhead and underground networks, metal poles, concrete poles, wooden poles, and 125 Watts mercury vapour, 150 and 250 watts sodium vapour luminaires. The management of public lighting poles in the Lubango city is done by the Provincial Government through the Provincial Directorate of Energy and Water (DPEA), and in the municipalities by the respective Municipal and Communal Administrations. The main energy sources for cooking are gas, charcoal and solid fuel (see **Table 4-12**).

Table 4-12: Households by main source of energy used for cooking.

Province, municipality and commune	Electricity	Gas	Petroleum	Charcoal	Firewood	Cardboard	None
Huíla	1,378	114,696	603	53,393	342,016	777	863
Lubango	941	87,108	383	29,404	35,459	307	241
Arimba	18	2.076	2	698	6,412	18	10

Source: INE, 2016.

Water supply, in quantity and quality, besides causing the improvement of the living conditions and welfare of a population, allows the control and prevention of diseases, the practice of hygienic habits, increases life expectancy and economic productivity of the country's citizens. In accordance with international standards, the following are considered appropriate sources: a tap connected to a water supply network, a neighbour's or building's tap, a public fountain, a pumped borehole, and a protected waterhole or spring. Access to water suitable for drinking is still low, covering only 42% of the country's population (INE, 2016).

In Huíla province only 35.5% of households have access to appropriate sources of drinking water, and the urban population is the most benefited. Cacimba (manually excavated water point) is the most widely used source of water by the population (mostly in rural areas). Alternative sources of energy are used by most of the population, include lantern, firewood, lamp, particular generator and candle. Among the municipalities there are significant differences in access to drinking water.

In Lubango municipality, 154, 102 people use appropriated water sources for drinking (see **Table 4-13**). According to INE (2014a), the appropriated water sources are house with water from public grid, common (building/neighbourhood) water source from public grid, public fountain, water hole with pump, protected cacimba, protected spring water.

The Lubango municipality presents the highest value in relation to the other municipalities with 62% of households with access to water suitable for drinking from public. There are 3 Water Treatment Plants in the region, namely Nossa Senhora do Monte, Tundavala and Calumue. Despite the operation of the stations, the region still experiences restrictions in the supply of water to all consumers. The municipality of Cacula has the lowest value with 11.9% (INE, 2016).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Table 4-13: Households by main source of drinking water.

Province, municipality and commune	Main source of drinking water					
	Water Truck	Protected Cacimba	Unprotected Spring	Rainwater	River/Stream	Other
Huíla	7,997	94,309	4,622	5,708	127,648	3,059
Lubango	7,337	41,249	4,586	455	16,174	1,538
Arimba	89	1,921	659	42	2,033	23

Source: INE, 2016.

Although there has been a 10% increase in the use of toilets connected to the sewer system, and 4% connected to a septic tank or well, however, between 2001 and 2009 there was no improvement at the national level, probably due to the fact that in rural areas more than 50% of the population defecates in grass, bushes, or in the open air. At Huíla provincial level, 26.4% of households use an appropriate location to defecate. However, this figure is only 7.1% in the rural area against 68.1% in the urban area (INE, 2016). Appropriate sanitary facilities sink or toilets, installations connected to septic tanks or in a dry latrine shall be considered (see **Figure 4-18**).

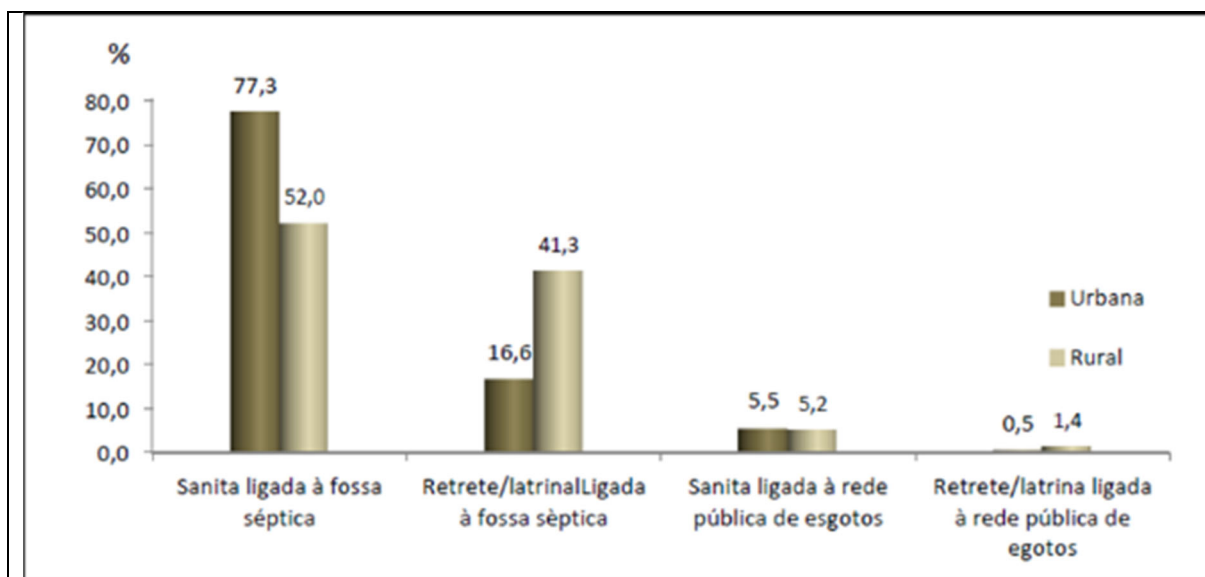


Figure 4-18: Households using appropriate sanitary facilities by area of residence.
Source: (INE, 2016).

4.2.4. Education

Since 2001, literacy has increased in Angola, reaching 76% at the national level. In 2001 there was a national level value of 66.8% and in 2008/2009, for this indicator the value increased to 76%. Urban areas recorded a higher percentage in relation to rural areas in both years, in 2001 the urban area recorded a value of 74.2% while in the rural area a value of 50.1% and in 2008/2009 the urban area had a record of 88.5%, while the rural area was 56.3%.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Regarding gender, the male population has a higher percentage than the female population in both years, men reached 82.1% while women reached 53.8%. In 2008/2009 85.1% and 67.8% were registered for males and females respectively.

Regarding education, the literacy rate expresses the relationship between the population, 15 years or older who can read and write, and the total population aged 15 years or older. The literacy rate in Huíla province is 51%, 80% in urban area and 36% in rural area. At the gender level, 64% of men can read and write, compared to 40% of women (INE, 2016b). In 2014, only 7% of the population aged 18 and over had completed the Second cycle of secondary education (they had completed the 12th or 13th grade). On the other hand, 16% of the population aged 18 years or older had completed primary education (they had completed 6th grade) (INE, 2016b). The analysis by age groups shows that only 7% of the population aged 18-24 completes the II cycle of secondary education, and for the population aged 25-64 years it is also 7% and for the population aged 65 or more 1% (INE, 2016b). About 28% of the population aged 5-18 years (INE, 2016b) is outside the education system. In all age groups there is a significant predominance of girls outside the education system, the difference between boys and girls is 10 percentage points in the 15-18 age group.

The province of Huila has approximately 1,835 schools, corresponding to 7,439 classrooms, of which 3,056 are definitive and 4,383 provisional, being currently enrolled about 770,873 pupils in the initiation, primary education, First and Second Cycles of Secondary Education. A total of 334,840 citizens, among children, youth and adolescents are outside the education system, due to the reduced number of schools, classrooms, and teachers. In rural areas, additionally, cultural issues prevent adolescent girls from studying, favouring instead their traditional roles taking care of the home. **Table 4-14** shows the education level of the population from Huíla Province.

Table 4-14: Resident population with 5 or more years according to the level of education completed and gender.

Province, municipality and commune	Level of education completed								
	Never attended school			Not completed			Primary level		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Huíla	636,418	236,571	399,847	826,135	414,519	411,616	280,752	151,620	129,132
Lubango	120,473	46,374	74,098	239,755	114,707	125,048	132,089	67,818	64,270
Arimba	12,672	4,760	7,912	15,430	7,990	7,441	4,791	2,657	2,134

Source: INE, 2016.

Regarding the institutions of secondary education, the highlight goes to the Instituto Médio Agrária do Tchivinguiro, the Instituto Médio Politécnico da Humpata, Instituto Médio Politécnico do Lubango. In the context of private education, the region has several colleges from primary to secondary education, and 2 private universities (Instituto Superior Politécnico Tundavala and Instituto Superior Politécnico Independente). In the public higher education sector, there are 2 universities in the region; ISCED and the Instituto Superior Politécnico da Huíla (see **Figure 4-19**).



Figure 4-19: Instituto Superior Politécnico da Huíla.

4.2.5. Health Sector

There is limited availability of health data in Angola, especially at provincial and municipal levels. Therefore, this section presents a provincial and regional view of the health system for Lubango municipality, and the affected areas where possible.

The prevention and combat of major epidemics such as malaria, and other diseases, observed in the country, are fundamental concerns of the sector to ensure the well-being of the population. In this sense, the health system has invested in building, rehabilitating and equipping health units and train health professionals. In the last 5 years, Angola has registered significant improvements, even though there are territorial differences (INE, 2016).

Huíla province has one general hospital, four provincial hospitals, 14 municipal hospitals, 19 reference health centres, four maternal and child centres, 39 health centres and 195 medical posts. In addition to these public units, other private health units provide services, totalling seven clinics, 45 medical centres, 61 nursing posts, three ophthalmology offices, one physical therapy centre, and five stomatology offices. The private health network also includes seven naturalistic medical centres, and a health school. All reference health units, public and private, are located in the Lubango urban centre, as it is the capital of the province.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

In Huíla province, the main health programmes include children's healthcare, the Immunisation Expansion Programme, nutrition, malaria control, HIV/AIDS, reproductive health, tuberculosis, blood services and physical medicine and rehabilitation. Many of these programmes are promoted by international donors such as USAID, WHO, UNDP, UNICEF and the European Union. The HIV/AIDS and malaria programmes receive the greatest support from donors and have the highest capacity and functionality. In view of the situation of the COVID-19 pandemic, a field hospital was built in the Lubango municipality. Meanwhile, health professionals remain aligned to the National Development Plan (PND), with primacy for maternal and childcare and nutrition, as well as the fight against major endemics (e.g., malaria, acute diarrheal diseases and respiratory diseases, etc.).

In Lubango (capital) the health situation is considered stable, in spite of the lack of consumable materials such as syringes, needles, gloves and pharmaceuticals in some hospitals and health centres. The situation is quite complex in the interior of the province where there is a shortage of everything from health professionals (doctors and nurses), expendable materials, ambulance for transporting patients, and medical assistance. The main diseases recorded in the region are: malaria, acute diarrheic diseases (ADD), acute respiratory diseases (ARD), typhoid fever, intestinal parasitosis, urinary tract infections, schistosomiasis, geohelminth infections, and HIV/AIDS. Malaria, ADD, schistosomiasis, and ARD are the main causes of infant mortality in the region. These diseases are fought by programmes which are monitored by the Ministry of Health and managed by the Provincial Health Directorate.

According to the 2015-16 Angola Multiple Indicator and Health Survey (IIMS), 26% of children aged 12-23 months in Huíla province had received all basic vaccinations; 1% of children aged 6-59 months tested positive for malaria by rapid diagnostic test (RDT); and 1% of women and men aged 15-49 were HIV positive (Angola Government, 2015).

4.2.6. Land Use and Territorial Planning

This section will give a detailed explanation of land use and territorial planning at the municipality level focusing in particular on the distribution line route (see **Tables 4-15, 4-16 and 4-17**). The Lubango city has grown with each passing day, but in addition to being not uniform, it is still a little disordered, coexisting with precarious and conventional modern constructions.

The Lubango city, witnessed a population invasion due to the war that ravaged the country and people were building disorderly given the pressure that was placed on them that was the posting in a territory without war (Administração Municipal do Lubango, 2014). Thus, some houses were built on the margin of the Law, because the process of legalization of land is quite time consuming, which leads people to build on weekends, without any technical guidance.

With the aim of improving the quality of life of the population and especially those living in risk areas, new housing areas have been identified where after urbanization some plots have been ceded to the population, the growth of Lubango municipality in the north direction, but the construction of the residences in these new areas differ from each other for economic and financial reasons, although new urban centralities are being built by the Central Government, confirming a "new" Lubango is being

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

born (Administração Municipal do Lubango, 2014). Near the distribution line proposed route in Lubango municipality the use of land is essential for agriculture propose, where the subsistence production of isolated peasants and others grouped into associations, and cooperatives predominates. The most significant production is concentrated in the crops of corn, *massango*, *massambala*, beans and basking beans (Administração Municipal do Lubango, 2014).

Table 4-15: Types of building material for houses by commune.

Province, municipality and commune	Households Total	Type of Building Material								
		Stone	Block	Brick	Adobe	Wood	Zinc	Sticks & Mud	Others	Not Specified
Huíla	514,412	402	18,029	17,553	283,465	614	2,846	190,411	581	512
Lubango	154,102	185	12,483	13,181	114,410	122	1,167	12,030	361	163
Arimba	9,242	4	229	317	7,097	6	92	1,439	50	7

Source: INE, 2016.

Table 4-16: Types of construction material of the houses ceiling by commune.

Province, municipality and commune	Households Total	Type of Floor Material							Not Specified
		Concrete	Tile	Fibre Cement	Zinc	Grass	Other		
Huíla	514,412	4,489	5,514	10,694	283,970	207,729	1,504	512	
Lubango	154,102	3,209	2,778	5,706	127,205	14,402	640	163	
Arimba	9,242	41	67	142	7,222	1,734	30	7	

Source: INE, 2016.

Table 4-17: Types of building materials of the floor of the houses by commune.

Province, municipality and commune	Households Total	Type of Floor Material						
		Sand	Cement	Tiles	Adobe	Marble/ Granite	Wooden Floors	Other
Huíla	514,412	411,512	86,274	13,065	592	1,226	1,231	512
Lubango	154,102	79,387	61,059	11,365	340	958	831	163
Arimba	9,242	7,538	1,459	202	15	2	19	7

Source: INE, 2016.

In general, the neighbourhood from Project has the characteristics of a rural or peri-urban area. The houses mainly display precarious characteristics and are made out of adobe and zinc plates while some are constructed from cement blocks, with two or more divisions according to the number of family members (see **Figure 4-20**).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Figure 4-20: Detail of the houses of the Project’s neighbourhood.

According to the INE 2014 census results, 70% of the country's population live in their own residences, 19% live in rented houses and only 19% live in houses bought or in the process of being bought, at the national level. Each residence has on average three divisions, having only an of average of 1.6 rooms with an average number of 2.9 people sleeping per room.

The photolog below illustrates the neighbourhood around the Arimba substation and distribution line.



Photos 1 and 2: Site for the planned Arimba substation site.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

<p>Photo 3: View opposite to the Arimba SS (I).</p>	<p>Photo 4: View opposite to the Arimba SS (II).</p>
<p>Photo 5: View opposite to the Arimba SS (III).</p>	<p>Photo 6: Access road to the planned Arimba SS.</p>
<p>Photo 7: View of the DL route (I).</p>	<p>Photo 8: View of the DL route (II).</p>
<p>Photo 9: View of the DL route (III).</p>	<p>Photo 10: View of the DL route (IV).</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

<p>Photo 11: View of the DL route (V).</p>	<p>Photo 12: Instituto Superior Politécnico da Huíla close to the DL route.</p>
<p>Photo 13 and Photo 14: Omatapalo Quarry.</p>	
	<p>Figure 4-21: Neighbourhood around the Arimba substation and distribution line.</p>

A number of infrastructures were identified around the DL and planned Arimba substation area (see **Figure 4-22**), namely:

- Omatapalo Quarry around 792 meters);
- Instituto Superior Politécnico da Huíla (around 230 metres); and
- Mukanka Lubango Airport (around 2.613 meters).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

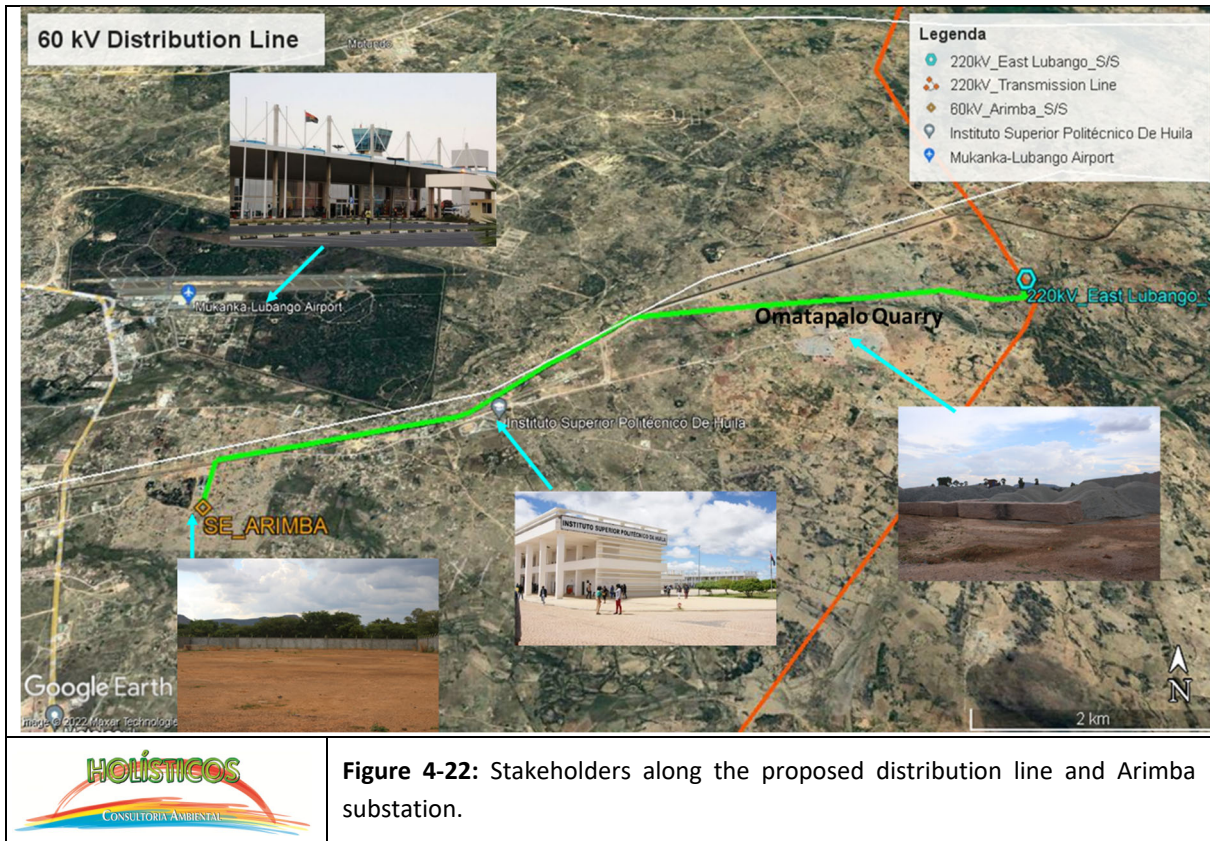
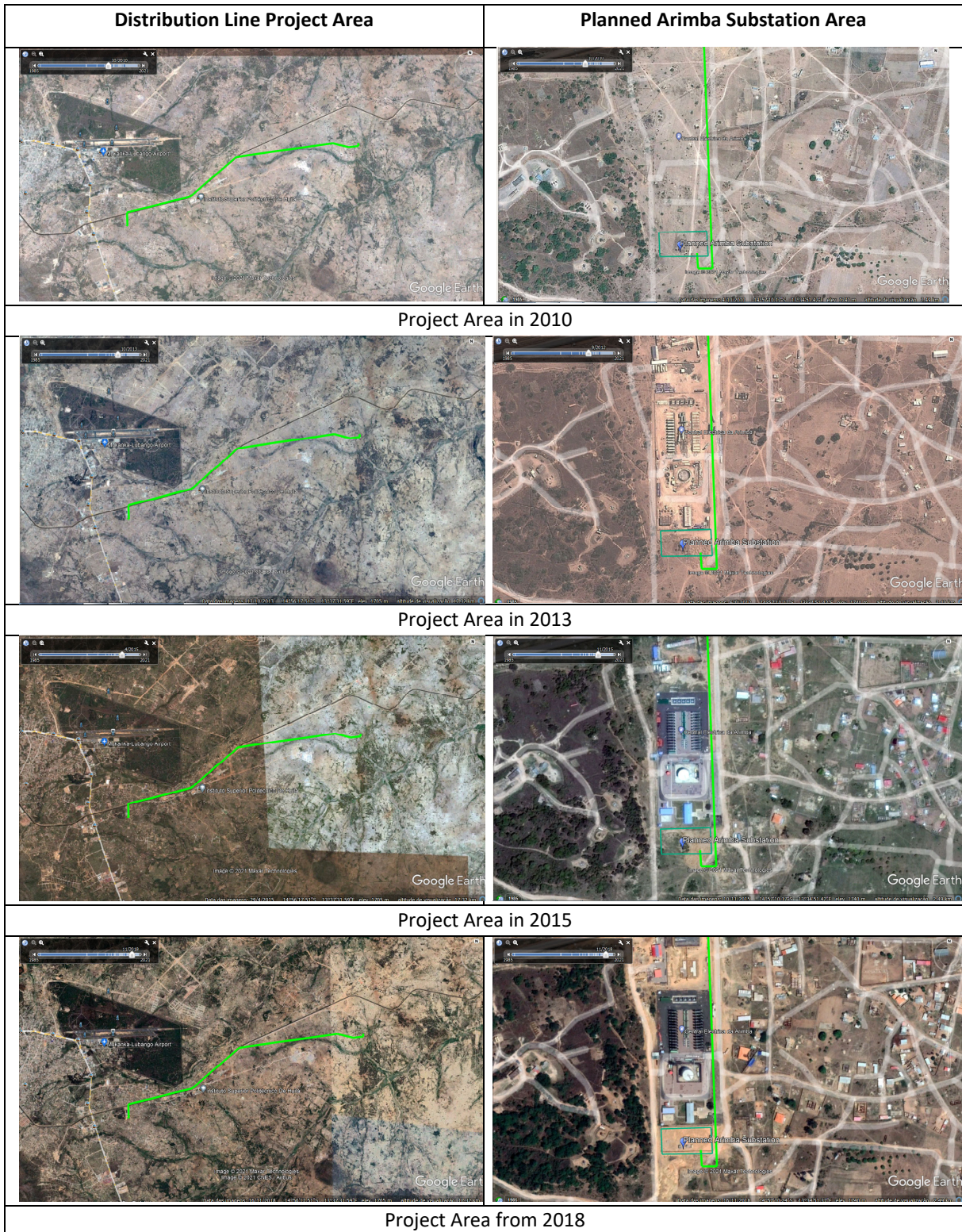


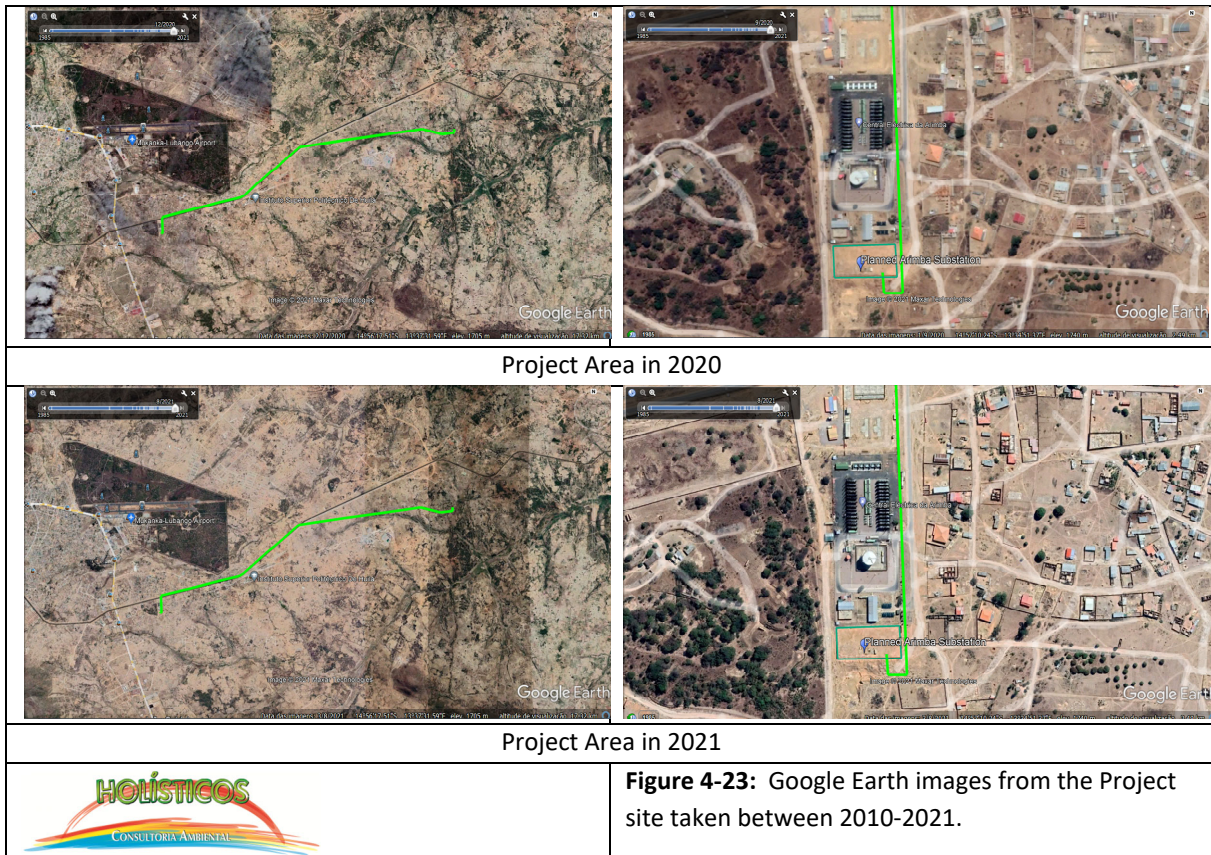
Figure 4-22: Stakeholders along the proposed distribution line and Arimba substation.

The figures below (see **Figure 4-23**) have been taken since 2010 from Google Earth images. They show the Project area throughout the years (from 2010 up to 2021), and as it can be observed, the Arimba substation site and the DL alignment land use has not changed throughout this period. The images show that there are signs of urban growth in the commune, particularly east to the existing East Arimba Substation.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



4.2.7. Security

The World Bank defines Gender-Based Violence (GBV) as: “violence that is directed against a person based on gender. It constitutes a breach of the fundamental right to life, liberty, security, dignity, equality between women and men, non-discrimination and physical and mental integrity” (World Bank, 2018). GBV does not only refer to violence against women and girls. It also can impact men and boys, particularly men who challenge or do not adhere to traditional male stereotypes.

GBV can include a range of different forms of violence, including intimate partner violence, female genital mutilation, child marriage, and child exploitation. According to the prevalence data on different forms of violence against women by the UN Women, in Angola 35% of women have suffered from lifetime physical and/ or sexual intimate partner violence, 26% have suffered physical and/or sexual intimate partner violence in the last 12 months and there is a 30% rate of child marriage.

However, there are no official national statistics regarding lifetime non-partner sexual violence. The Global Gender Gap Index rank for Angola, which benchmarks national gender gaps on economic, political, education and health criteria, is 117 (out of 144 countries) (World Economic Forum, the Global Gender Gap Report, 2016). Furthermore, the UN Committee on the Elimination of Discrimination against Women’s seventh report of Angola stated that “there had been 529 cases of domestic violence in 2017, which probably did not reflect the realities due to the non-reporting of cases. Many victims of domestic violence did not want to leave their homes and live in shelters”.

On the other hand, the Ministry of Social Action, Family and Women Promotion (Masfamu) in 2017 said that at least 6,097 domestic violence cases were reported in the country. Angola passed the Law on Domestic Violence (Law No. 25/11 of June 14th), an instrument to combat this social issue, which also allows a third person to report such a situation. However, Angola remains highly influenced by patriarchal norms shaping social perceptions about the subordination of women in spousal and family life (Nzatuzola, 2005). At the level of the Huíla highlight the crimes of voluntary manslaughter, grievous bodily harm, rape, robbery and theft as the main crimes.

Given the situation of public calamity, part of the police force is working to guide compliance with the measures against Covid-19, while another group is in charge of its normal activity, which is the maintenance of order and public safety.

4.2.8. Ecosystem Services

Ecosystem services are the benefits that ecosystems provide to people, including many resources that underpin basic human health and survival needs, support economic activities and provide cultural fulfilment. This section describes ecosystem services identified as important for populations in the Huíla province. Considering the rural setting of the Project region, it is likely that local communities highly rely on the use of natural resources for their livelihoods. These activities may be for self-consumption as well as for selling.

Hunting, although prohibited nationally, is an activity carried out in the region by a minority of people. Bushbuck, warthogs, monkeys and Grey Duiker are the main hunted species. Forestry also provides the population with a variety of different resources. The main forest products include coal, fire wood, wood, wild fruits, and medicinal plants, which are traded on the side of the roads. Within the Project footprint there are important areas for ecosystem services delivery, particularly close to the river. The riverbanks and associated vegetation provide a wide range of ecological, political, economic, social and cultural services which include the following:

Provisioning Services

People's livelihoods in the Project area are dependent on agriculture services to supply protein for local communities. Timber is used for construction and other timber products are used for charcoal and wood fuel, including stumps and roots, and harvesting residue; non-timber forest products such as food products derived from plants; water-supply services through the provision of surface water; and habitat for a number of biodiversity species.

Regulating Services

Regulating climate by means of carbon capture and storage as well as maintaining the quality of air and soil, providing flood and disease control, or pollinating crops are some of the 'regulating services' provided by ecosystems. Protection from soil erosion in certain areas of the Project site is key, particularly along the watercourses. They are often invisible and therefore mostly taken for granted. When they are damaged, the resulting losses can be substantial and difficult to restore.

Cultural Services

The non-material benefits people obtain from ecosystems are called “cultural services”. They include aesthetic inspiration, cultural identity, sense of home, and spiritual experience related to the natural environment. Cultural services are deeply interconnected with each other and often connected to provisioning and regulating services: small-scale agriculture is mostly for subsistence.

Supporting Services

Benefits for people living near the forested areas and the existence of cultural and spiritual associations between the people and the surrounding environment. In Lubango for example people used to meet under large trees during day.

Five distinct livelihood zones are depicted in Project area of influence, namely: urban zones, coastal fishing, ephemeral river crop farming, western pastoralism and commercial farming (see). Some are large, covering huge swathes of the region, while others are concentrated in small patches of towns, fishing villages and along rivers that flow only from time to time.

Not everyone lives the same way in each zone. Rather, each zone encompasses an area where most people live in comparable ways: growing similar crops, with roughly the same kinds of livestock, selling more or less similar goods, or having related enterprises (John & Stephe Mendelsohn, 2018).

The zones are often called agro-ecological zones because many of their characteristics come from agricultural practices, such as types of crops and livestock, which, in turn, are direct or indirect consequences of soil types, geology and geomorphology, vegetation and climate. There are also linkages between livelihood zones and types of houses and ethnic-linguistic groups (John & Stephe Mendelsohn, 2018).

4.2.9. Economy and Livelihoods

The economy of Huíla province is based on subsistence agriculture, livestock, the processing industry, tourism, formal and informal trade. Agriculture is the main economic activity in the region.

Agriculture

Agricultural activity plays a prominent role in the socio-economic life of the people of the Huila province representing in conjunction with the livestock, the main source of income and resources of communities. The agricultural situation in the Huila province is characterized essentially by a rudimentary agriculture and subsistence, being developed by small traditional family producers and small farmers. This presents itself with low yields, reflecting the absolute dependence on rainfall, predominantly scarce and irregular. This dependence is aggravated by the fact that the soils are extremely permeable and the water reserve infrastructure is insufficient.

The main crops produced in region are: maize, millet and sorghum, melons, beans, cowpeas, nuts, sweet potatoes, cassava, tomatoes, cabbage, peppers, carrots, garlic, spinach, corn, beans, sweet and

reindeer potatoes, vegetables, bananas and citrus. The crops are used for domestic consumption and limited sales. However, most of crops are produced during the rainy season only.

In terms of annual production, maize, millet and sorghum are the main crops planted, representing more than 90% of the cultivated area in the province of Huila; potatoes, sweet potatoes, cassava, peanuts, vegetables, cucurbits and fruit trees are the types of crops with less productive expression, since they are irrigated crops. In this sense, the development of irrigated systems allied to a business farm are factors that enhance production, diversifying the type of species, as well as the number of harvests per year. It is noteworthy that horticultural crops, potato and manioc represent the highest production in relation to the area cultivated per hectare, about 13.5, 8.0 and 7.6 (ton/ha) respectively (Angola Government, 2016).

At the level of Huila, for the agricultural year 2020/2021 at least 219,800 families are involved in the Activity, residents in 876 villages, with 2,758 families receiving support from the provincial office of Agriculture, and from Non-Governmental Organizations. The families are part of 835 associations and 224 cooperatives.

Livestock

Livestock is one of the main sources of income in the Huila province, and the most representative species of activity are cattle and small ruminants (goats), accumulating more than half the total production of the region. Domestic stock is an integral part of the lives of most rural people in Huíla Province. Many young people grow up surrounded by animals, often tending them from an early age. Young men may later inherit, or be lent animals by family members to start their own livestock holdings.

Cattle herders and owners may be away from home for months, shifting their animals hundreds of kilometres between grazing areas, often on a regular, seasonal basis. And livestock provide food, income, savings, transport and traction, as well as family bonds and measures of wealth and social status. These are some of the ways that poultry, pigs, goats and sheep, donkeys and cattle shape the lives and opportunities of people. In short, domestic animals are fundamental to Southwest Angola's socio-economic landscape. One reason for this is that much of the region has a dry, warm environment which provides for good grazing and browse to support low intensity farming and rearing of livestock. Much of the region is also poorly suited to crop plant, and so investing in livestock is more of a success.

Livestock are dominated by cattle (see **Figure 4-24**), goats and chickens, but many homes also keep sheep and some pigs, donkeys, horses and ducks (John & Stephe Mendelsohn, 2018).



Figure 4-24: Raising cattle in Poaires Muhaha.

There is considerable variation in the ownership of livestock: in the number and types of animals kept from one area to another, and from one home to another. The most favourable conditions are in the semi-arid western and southern parts of the region where the quality of forage is relatively high and diseases are less troublesome than in the northern and eastern areas of Huíla. Here, in its more tropical wet climate, grass is often tough, unpalatable and lacking in nutritional value, and various diseases further limit the health and numbers of livestock.

At the level of rural areas, the livestock produced are essentially used for self-consumption, as suppliers of derivative products such as milk and eggs, as well as to be traded or to serve as a means of exchange for other goods. However, this exchange inevitably leads to the aging and annihilation of the genetic heritage of their livestock, with adverse consequences on their economic performance, since the animals traded are primarily young males and occasionally poorly productive adults and females for retirement, making the selection of older cattle.

The cattle work as a savings account that guarantees interest (birth of animals) and generates a flow of income (exchange or sale of animals). It is through the exchange/sale of animals that families obtain the goods they need, including cereals to supplement their food needs.

4.2.10. Tourism and Cultural Heritage

The culture sector of Huíla province has carried out work to survey, study, protect and enhance the cultural heritage, within the framework of its strategic program. The Provincial Directorate of Culture of Huíla has inventoried 180 monuments and historical sites, as well as 121 Ombalas (villages of sobas) that need to be classified. They are part of these monuments and local sites of civil, military, religious, funerary architecture, historical site, historical, landscape and natural areas. The natural areas have attracted many domestic and foreign tourists are among others, the following:

- Catholic Mission of Huíla Municipality;
- Building where the Provincial Directorate of Culture of Huíla operates;
- Statue of *Cristo Rei*;
- Chapel of *Nossa Senhora do Monte*;
- Building of the core of the National Assembly;
- Huíla Regional Museum;
- Catholic Mission of Jau (in Chibia municipality);
- Tundavala Gorge;
- The Hungueria waterfalls.

Besides its cultural importance, the Tundavala Gorge is also an important area in terms of biodiversity, mostly in relation to flora and avifauna. The Tundavala Gorge, which offers stunning views of the Huíla plateau; It is located in edge of Humpata, 20 km from Lubango, in the vicinity of the proposed distribution line route.

The province has a high concentration of hotel establishments and the like, due to the various leisure options it offers with the natural resources it holds. Huíla has 799 hotel units and complementary services, until the 3rd quarter of 2013, distributed by the 14 municipalities (Angola Government, 2014). In the last 10 years, this number has increased significantly due to more investments in tourism in province. In fact, the province has natural, cultural and socio-economic resources that, in essence, constitute values of a high tourist potential, which can be dedicated to rural areas or to tourism for cultural and urban leisure, especially in Lubango, which competes as a World Heritage Site by UNESCO (Angola Government, 2014).

The cultural and natural heritage existing in Huíla deserves a particular attention, because it has a dimension and importance that allow a very specific tourist attraction. The increasing influx of tourists from all over the world, including from Namibia, South Africa and some European countries, highlights the potential of the province, whose development of this sector is oriented towards the sustainable exploitation of resources. Stand out as tourist areas of interest of the province, the Tundavala gorge in Lubango. From the top of the mountain it is possible to have a total and magnificent view of the rifts and part of the province.

The architectural monument known as Cristo Rei (see **Figure 4-25**), located in the Chela Mountain range in Lubango, is 14 meters high, having a privileged view over the city of Lubango. In terms of

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

religion, the Catholic religion, is the predominant religion in the province of Huíla, practiced by 61% of the resident population, followed by the Protestant religion with 25%.

The religious institutions are integrated into the local society and continue to play a positive role in the communities of the Lubango and Humpata municipalities, in areas such as evangelisation, spirit pacification, education, religious awareness amongst local youngsters and fostering of family harmony. Churches also participate in other social events in the Huíla region.



Figure 4-25: Cristo Rei Monument in Lubango.

Of the above-mentioned cultural sites, only those located in vicinity of the proposed project area can be potentially affected, as shown in **Table 4-18**. At the level of the province of Huila, more than 50 carnival groups are registered, including children, adults, and entertainment blocks.

Table 4-18: Cultural sites potentially affected by the proposed project area.

Municipality	Cultural site
Lubango	Tundavala gorge
	Chapel of <i>Nossa Senhora do Monte</i>

4.2.11. Infrastructure of Transport

In the context of southern Angola, Huila holds a relevant strategic position, enhanced by its air, railway, and road connections. The improvement of these systems contributes decisively to the development of a local and regional economic base. The road network in Huila province is in a poor state of conservation (see **Figure 4-26**). Of the more than 1600 km of roads belonging to the so-called core network, by 2009 only 553.8 km had been upgraded and partially asphalted.

Regarding the airport network, the province of Huila has an operational infrastructure and in perfect conditions for landing and take-off that provides the frequency of flights. The international airport of Mukanka, presents a national and international passenger terminal, with an area of 6,500 m², with a Control Tower, a cargo terminal with 4,000 m², an auxiliary runway with 2,800 m by 30 of width and a main runway with 3,300 m. This airport also has an aircraft parking apron with 375 m by 125 m, a Building for Firefighting Service and parking for 200 vehicles and road access.



Figure 4-26: Road network of Huila province.

4.2.12. Telecommunications

Regarding the telecommunications sector, the information and communication access services in operation in the city of Lubango are: telephone services provided by the two main mobile telephone operators in the country, namely Unitel and Movitel; radio stations with Radio Lubango; and Television with the Public Television of Angola (TPA), with emission of channels 1 and 2 with the signal captured by satellite and the Private TV channels TV Zimbo and ZAP. There is also a delegation from the Angola Press Agency and the circulation of the Angola newspaper, sports and private forum newspapers.

4.2.13. Industrial Sector

Huíla province has been undergoing changes that create the conditions for a new business dynamic, namely due to improved accessibility, tourism development and the emergence of logistics platforms and the production of agricultural equipment and utensils. Most of Huíla's land area is devoted to agriculture and livestock, and these are two of the most propitious sectors for the development of industry. The geological and mining sector in the province has been gaining prominence in almost all the municipalities due to the strong pressure that the real estate market, civil construction and individual housing construction exerts on both mechanised and artisanal exploration.

According to the Provincial Directorate of Industry, Geology and Mines, there are 41 companies operating in this branch in the province, with Ornamental Rock exploration being the most representative, with 15 companies in activity, followed by the crusher branch with 13 companies.

4.2.14. Ethnicity and Religion

The settlements and neighbourhoods belonging to the municipalities of Lubango the populations are predominantly of ethnic Nyaneca-Humbi, although due to some cultural similarity there are groups belonging to ethnic Ovimbundu to a lesser extent. The language most spoken in these settlements is Nyaneca-Humbi. Attracted by the edaphoclimatic conditions of the region, considered sustainable for agriculture and pastoralism, in some settlements and neighbourhoods the team found people belonging to the Muílas, Mucubal, Nganguela, Cuanyama, Tchokwé and Bakongo ethnic groups, although in extremely reduced numbers. Many of them have adapted to the cultural and lifestyle of Nyaneca-Humbi group.

4.2.15. Housing

The houses are mostly made of permanent construction material (blocks and bricks), plastered, painted and with roofs of zinc sheets, tiles, fibre cement sheets and other materials. In the settlement of Poiães Muhaha, the team observed mostly houses built with zinc sheeting material (sheet-metal houses) and others with adobe material burnt with grass, some with zinc sheeting and others with straw, followed by cubata houses (straw houses with a height of no more than 1.5 metres). The rudimentary structures that serve as dwellings reflect both the poverty and misery that plague the region and the nomadic lifestyle of many people.

The houses have on average two divisions (a bedroom and living room) the kitchen and the latrine are always outside and slightly away from the houses for cultural reasons. As there is no electricity from the public grid in the communities, most of the houses do not have domestic appliances (e.g., refrigerators, television, radio, air-conditioners, etc.). The average household is composed of four to five people, including the couple and minor children.

4.2.16. Infrastructures on the Project Route

During September and November infrastructures were mapped along 500 m buffer of the proposed distribution line route. The mapped infrastructures include the Omatapalo Quarry, Instituto Superior Politécnico da Huíla and the Mukanka Lubango Airport.

Table 4-19: Main infrastructures mapped in the right-of-way and within a 500 m radius of the Project route in the Poiares region.

Infrastructure	Name	Geographical coordinates
Quarry	Omatapalo Quarry	14°56'1.64"S 13°38'22.57"E
Polytechnic Higher Institute	Instituto Superior Politécnico da Huíla	14°56'37.25"S 13°36'20.38"E
Airport	Mukanka Lubango Airport	14°55'41.16"S 13°34'19.12"E

4.3. Stakeholder Engagement Meetings

It is important to note that this is a public project not an Independent Distribution Line Transport project. This Project will be built for the MINEA in Angola as a public infrastructure project and will be owned and operated by the National Electricity Distribution Company (ENDE).

The distribution line project, as a public infrastructure project on public land owned by Huíla Provincial Government, the procedures regarding this project and interaction with Angolan citizens and businesses are governed by internal Angolan laws using where necessary JICA Guidelines, and international best practices. ENDE as a state-owned electricity distribution company, has policies and personnel to deal with outside persons and business entities.

4.3.1. Stakeholder Engagement Strategy

During the development of the SES report, was stakeholder engagement meeting on 18 November 2021 in Arimba, (commune affected by the project). The objectives of the meeting were four-fold, namely a) present the Project to the governmental institutions and traditional authorities, b) obtain feedback on issues of concern, questions and expectations of the participants, c) identify potential stakeholders, and d) social baseline collection. Participants of these meetings included Members of the Communal Consultation Committee of Arimba, including representatives of communal administration, traditional leaders, and Committee of Residents of Arimba Neighbourhood.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The stakeholder engagement meeting was organised by ENDE, and were attended by 16 participants. Women attendance to the stakeholder engagement meetings was low (6 members). To present the Project information a presentation was carried out in Portuguese, and in addition to the presentation a Background Information Document (BID) was produced and distributed to all participants.

A presentation was carried out in Portuguese, the national official language. Banner was prepared with relevant information about the Project, and BID was also produced and distributed to all participants.

Letters about the meetings were sent to the Governments of the Province of Huíla. The Government of the Province of Huíla had the responsibility to communicate the settlements and the traditional authorities within their respective jurisdictions. Apart from ye

4.3.2. Summary of the Stakeholder Meetings

Table 4-20 presents a summary of the key issues raised by the participants in stakeholder engagement meeting and responses provided by representatives from ENDE and Holísticos. Photographic evidence of the stakeholder meeting is presented below and more detailed information on the meetings can be found in the Minutes of the Meeting (see **Appendix 8**).

Table 4-20: Summary of key questions from the stakeholders in Arimba (Phase 1).

Questions raised	Responses and Clarifications
<p>Pedro Adolfo Gomes (PG) – Poiaras Muhaha village resident.</p> <p>PG mentioned that he had not heard during the presentation whether the residents of Nombungo have been registered, how many people live there, the size of their farms and livestock, and whether registration work had already begun.</p> <p>Additionally, he questioned the benefits they would receive if displaced.</p> <p>Has the same work been completed or not in the area where the Muhaha branch line will run? If people are displaced, has the government made alternative housing available to them?</p> <p>There are numerous unemployed youth in the commune; will they be a part of the labour force during the Project's construction?</p>	<p>Nobel Adão – ENDE</p> <p>The Nombungo Project, located 25 kilometres after the three bridges that cross Mutundo, which is in the scope of the National Electrification Master Plan, was approved by the President of the Republic due to the urgency of connecting the 220 kV Belém do Dango line from the province of Huambo to the province of Huíla.</p> <p>The State's primary objective is to reduce expenditure on thermal power plants, which is why it approved this Project quickly; it aims to integrate Hula as quickly as possible (2023-2025 at the latest). This Project (ENDE) is interlinked with another project (RNT), in which the team are currently elaborating an environmental study, which is already advanced. The teams are working on the line corridor from Belém do Dango to Lubango, which is a RNT macro-project that will see the construction of a 220/60 kV line to the city of Lubango and will interconnect with the Caconda and Caluquembe corridors; all of these municipalities will be electrified.</p> <p>Concerning jobs in the short, medium, and long term, the goal is to work with administrations to ensure that public tenders are conducted with local personnel in order to avoid outsourcing.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
	<p>Elayne Miranda added that the company is also conducting an Environmental Impact Study for the 220 kV line that will pass through Nombungo, and that three consultations have already been held with communities affected by the Project.</p> <p>She mentioned that since Wednesday (November 17, 2021), a census of households had been ongoing in order to register them, learn about their way of life, and determine their monthly expenditures. Elayne Miranda added that all projects are developed in collaboration with the Arimba Municipal Administration.</p> <p>The contractor that ENDE selects to construct the line will be required to subcontract 40% local labour. There is a need for young people to receive training; the contractor will require welders, electricians and cooks in order to construct and maintain a yard. This question is safeguarded under ENDE and national legislation.</p>
<p>Pedro Simplicio (PS) – Tchingalangango neighbourhood resident</p> <p>A detour will be required to construct a transformer station in order to deliver energy to residents. Will this energy benefit residents in areas with a population? It is meaningless to assert that displaced residents will be compensated or relocated if they do not benefit from electricity that passes through their communities.</p>	<p>Nobel Adão – ENDE</p> <p>He emphasized that electrification is impossible without providing sufficient power. To begin, 400 kV must be transported from very high voltage towers to 220 kV and then down to 60 kV. Only by connecting the 60 kV line to a substation and converting it to a medium voltage will the province be electrified. The final product is electrification, which entails placing transformer stations in neighbourhoods that ENDE is currently surveying, followed by the installation of low-voltage poles, which are standard circuits with black cables technically referred to as Low Smoke Zero Halogen Cables (LXS), and finally, connection to the final consumer.</p> <p>Numerous areas are being overlooked for electrification, and we have received complaints at the provincial level from 14 municipalities regarding areas that have been electrified for more than two decades but have never received reliable electricity.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
<p>Photo 1: Detail of those present at the Arimba commune stakeholder engagement meeting.</p>	<p>Photo 2: Opening of the Arimba commune auscultation.</p>
<p>Photo 3: Presentation of the Project by ENDE.</p>	<p>Photo 4: Presentation of the environmental and socioeconomic aspects of the Project.</p>
<p>Photo 5: Intervention of Pedro Adolfo Gomes.</p>	<p>Photo 6: Intervention of Pedro Simplício.</p>

The meetings were announced through letters sent by the Government of Huíla Province, which had the responsibility to communicate the dates to the settlements and traditional authorities within their respective jurisdiction (municipal administrations). With the support of Holísticos the updated Background Information Document (BID), announcement in the Jornal de Angola, and attendance list, etc. were prepared.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Between June 7 and 9, 2022, public consultation meetings were held with stakeholders from the community of Arimba and also the municipality of Lubango. Among the participants in these stakeholders meetings were the Deputy Administrator for the Technical Area, the Community Administrator of Arimba, Municipal Directors, Traditional Authorities, and neighbourhood coordinators. The objective of this meeting was to present the results of the Simplified Environmental Study report and to obtain feedback on issues of concern, doubts, and expectations from the participants.

On the 7th, the public hearing meeting was attended by 36 participants (six of which were female - 16%). The presentation of the project information was done in Portuguese, the national official language, and whenever possible and necessarily had simultaneous translation from Portuguese to Nyaneca-Humbi in order to ensure the understanding of the project by all participants. On day 9, 20 participants attended the meeting (two were female - 10%).

Table 4-21 and **Table 4-22** presents a summary of the key issues raised by the participants in stakeholder engagement meeting and responses provided by representatives from ENDE and Holísticos and photographs of the meeting with stakeholders. More detailed information on the meetings can be found in the Minutes of the Meetings (see **Appendix 8**).

Table 4-21: Summary of key questions from the stakeholders in Arimba (Phase 2).

Questions raised	Responses and Clarifications
<p>Manuel António (MA) - Resident. MA questioned about the process of resettlement and compensation in case of damage to the mines and affectation of houses.</p>	<p>Eduardo Ferdinand - Holísticos The Project is being funded by JICA which takes the issues of involuntary resettlement (for damage to infrastructure and livelihoods of others) and fair compensation very seriously and will not provide full funding to the Project unless these issues are properly analysed, avoided or compensated for under current Angolan law and JICA requirements where applicable.</p> <p>He stressed that the 60 kV electricity distribution line planned to be installed between the Lubango East and Arimba substations could not pass over houses, schools, hospitals and large trees whose height is over 8 m. However, he explained that there will be situations where this cannot be avoided, so ENDE and JICA have very explicit technical standards for such situations. An Abbreviated Resettlement Action Plan is being prepared for potentially affected parties, to ensure that families affected by the Project have the same or better living conditions and welfare compared to those existing prior to the Project's development in the region.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
	<p>Compensation for lost plots and fruit trees will be carried out under the table of crop prices per square metre or hectare prepared by the then Ministry of Agriculture and Fisheries (National Agriculture Directorate), and everything will be duly agreed upon, signed and done transparently and honestly so that compensation is guaranteed to potentially affected parties.</p> <p>However, the amount to be paid for plots mapped as affected will be in function of the production of agricultural products by species that they present and not in function of the annual production that the farmer claims to produce. At the end of the whole registration process of the affected plot and compensation, the agricultural production monetarily compensated will be offered to the farmer (owner of the plot), with deadlines set for the collection of production.</p> <p>In cases where a house is affected by the Project, there will be a registration and evaluation of its value in the national market and the affected parties may receive a house with the same or even better conditions than the one displaced along the Project's route. During the construction of the houses, the recommendations or requests of the affected families in terms of finishing and adjustment of the rooms will also be taken into consideration.</p> <p>Catarino Cosme - RNT He drew attention to the acts of opportunism, mentioning that only the affected and previously registered parties will receive compensation for the allocation of their houses, plots, and other structures. He pointed out that in the case of total or partial affectation of a house, the form of negotiation or compensation will be exclusively being provided with a house. He reinforced that the financial compensations in case of resettlement of houses will be avoided due to the lessons learned in other projects promoted by RNT, giving the example that some people preferred to acquire electrical appliances and consumer goods, and ended being no longer able to build the houses.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
<p>Evaristo António (EA) - Coordinator of the Lola neighbourhood 2. Amélia Sacapito (AS) - Resident of the Tchiwaya neighbourhood. Ernesto Hiluco (EH) - Resident of 11 de Novembro.</p> <p>EA and AS stressed that they understood the explanations made about the Project, and suggested that the registration of houses along the route of the electricity transmission lines (houses, plots, grazing areas, etc.) should be done soon, to avoid possible opportunists. They also suggested holding stakeholder engagement meetings with families affected by the Project (farmers, owners of properties and land, etc.) to better clarify the Project and its potential negative and positive impacts before the implementation of reconfirmation works of the potentially affected parties and the beginning of possible compensations.</p> <p>EH informed that as coordinator of the 11 de Novembro neighbourhood he had not taken note of the census work of the people and properties present on the route of the 60 and 220 kV Projects.</p> <p>EH Suggested that the neighbourhood coordinators be involved in future activities in order to eliminate the presence of possible opportunists and/or avoid acts of injustice. He concluded by praising the Government's initiative, and that the community of the 11 de Novembro neighbourhood willingly accepts its implementation since it will benefit from the power of the 60 kV distribution line.</p>	<p>Eduardo Ferdinand - Holísticos</p> <p>He explained in detail the census work of the potentially affected parties that was carried out in November (RNT) and December (ENDE) 2021 along the routes of the two Projects presented. He informed that for safety reasons and compliance with international standards, houses, schools, hospitals and other infrastructures of a permanent nature cannot be permitted on the 220 kV (45 m) and 60 kV (24 m) Project easement.</p> <p>He stressed that the routes presented are not the final ones and that a set of studies will be carried out to determine the final route, highlighting the studies of soils, geology, topography, geomorphology, etc. He stressed that before the implementation of the Project, the project promoters have also been taking into consideration the cost-benefit effect prior to the compensation decision.</p> <p>Good note was taken on the suggestion of Mr. EH.</p> <p>Nobel Adão - ENDE</p> <p>He noted that with the implementation of the 60 kV electricity distribution line Project and the operation of the Arimba Substation it would now be possible to distribute electricity to more communities in Arimba commune and Lubango municipality.</p> <p>He asked those present and the representatives of the Arimba Communal Administration, to massively disseminate the Project and the meetings to the absent parties in order to be informed about the Project.</p>
<p>Francisco Tchihena (FT) - Resident of the Muhaha neighbourhood.</p> <p>FT questioned whether there is a need to abandon his house now, as it is very close to the site of the future Lubango East Substation.</p> <p>FT said that work was currently underway to clear the vegetation on the site of the future Lubango East Substation.</p>	<p>Eduardo Ferdinand - Holísticos</p> <p>He mentioned that it was extremely premature to relocate the population close to the perimeter of the site of the future Lubango East Substation. However, he explained that their continuity will depend on the safety limits (international safety standards) necessary for the safety of people and the Project. He stressed that the companies ENDE/RNT have started a process to create working committees for the permanent and frequent monitoring of the final route of the two Projects will be in place in order to avoid opportunists (people who choose to build</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
	<p>houses on the final route of the transmission lines so that they can benefit monetarily).</p> <p>Catarino Cosme - RNT He explained that the compensation process will be assured by the Angolan Government and not by JICA. He asked for support from the community so as not to increase the costs of the Project with the emergence of possible opportunists.</p> <p>The vegetation removal works on the Project's land are only for the placement of boundary markers, land delimitation and occupation signage (RNT - Lubango East Substation).</p>
<p>Photo 1: Detail of those present at the stakeholder engagement meeting in Arimba commune (Phase 2 (ENDE) and Phase 4 (RNT)).</p>	<p>Photo 2: Opening of the stakeholder engagement meeting in Arimba commune by Mr. Alegria Kulunetos.</p>
<p>Photo 3: Presentation of the Project by Elayne Miranda (Holísticos).</p>	<p>Photo 4: Intervention by Mr. Francisco Tchihena.</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



Questions raised	Responses and Clarifications
 <p>Photo 5: Clarification from Mr. Catarino Cosme (RNT).</p>	 <p>Photo 6: Clarification from Mr. Nobel Adão (ENDE).</p>

Table 4-22: Summary of key questions from the stakeholders in Lubango municipality (Phase 4).

Questions raised	Responses and Clarifications
<p>Orlando José Bras (OB) - Deputy Municipal Administrator for the Technical Area.</p> <p>OB praised the Project's initiative and also the presentation and said that the Project is an added value for the Huíla province. He also expressed that he was satisfied with the fact that the issue of compensation for the families that will be potentially affected by the implementation of the Project is safeguarded and with the generation of local employability.</p> <p>He stressed that the timing of the Project has to be taken into account, due to the end of the dry season, and the need to prepare the land for agriculture.</p>	<p>Eduardo Ferdinand – Holísticos.</p> <p>He mentioned that since the Project will not start now, the population will be able to make use of the land for cultivation for the time being. As soon as an exact date for the start of the Project is planned, the RNT will inform the Local and Communal Administrations.</p>
<p>Ana Domingos (AD) – Communal Administrator of Arimba.</p> <p>AD praised and was pleased with the Project's initiative because the lack of electricity in the Commune is a major concern. She has been following the Project since 2019, and whenever possible she participates in all meetings.</p>	
<p>Adilson Domingos (AD) – Municipal Director of Energy and Water.</p> <p>AD stressed that there is a need to know the final route of the Project, since it is already beginning to be widely publicized in the municipality, in order to avoid opportunism.</p>	<p>Eduardo Ferdinand – Holísticos</p> <p>He stressed that the route presented is not the final one and that a set of studies will be carried out to determine their viability, highlighting studies of soils, geology, topography, geomorphology, etc. He stressed that during the execution of the Project its promoters will also consider the cost-benefit effect before the compensation decision, so that the</p>


Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
<p>He inquired about the resettlement process and compensation in the event of damage to the fields and allocation of houses, facilitating communication between the RNT and the Municipal and Communal Administration.</p>	<p>Project doesn't become extremely expensive due to the compensation and physical resettlement process.</p> <p>Catarino Cosme – RNT</p> <p>The Project is being financed by JICA and it takes the issues of involuntary resettlement (for damage to infrastructure and allocations to the livelihoods of others) and fair compensation very seriously, and will not provide full Project funding until these issues are correctly analysed, avoided or compensated according to the Angolan legislation in force and where the JICA requirements are applicable.</p> <p>He stressed that the 60 kV electricity distribution line planned to be installed between the East Lubango and Arimba substations cannot pass over houses, schools, hospitals and large trees whose height is greater than 8 m.</p> <p>However, he explained that there will be situations in which this cannot be avoided, for which ENDE and JICA have very explicit technical standards for these situations. An Abbreviated Resettlement Action Plan is being prepared for the potentially affected parties, in order to ensure that the Project-affected families have the same or better living conditions and well-being compared to those existing prior to the Project's development in the region.</p> <p>Compensation for lost crops and fruit trees will be carried out in accordance with the crop price table per square meter or hectare produced by the then Ministry of Agriculture and Fisheries (National Directorate of Agriculture), and that everything will be duly agreed, signed and done transparently and honestly so that compensation is guaranteed to potentially affected parties.</p> <p>However, the amount to be paid for the fields mapped as affected will depend on the production of agricultural goods according to their species and not on the basis of the annual production that the farmer claims to produce. At the end of the entire process of registration of the affected field and compensation, the agricultural production monetarily compensated</p>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
	<p>will be offered to the farmer, with deadlines for the collection of production.</p> <p>In the event that a house is allocated by the Project, there will be a registration and assessment of its value in the national market and the affected parties will be able to receive a house with the same conditions or even better than the one evicted along the Project's route.</p> <p>During the construction of the houses, the recommendations or requests of the affected families in terms of finishing and adjusting the partitions will also be taken into account.</p>
<p>Fábio António (FA) – Director of Agriculture FA praised the implementation of the Project, and asked about the distance that agricultural activities should have from the towers.</p>	<p>Catarino Cosme – RNT For the construction phase of the Project, there should be nothing in a 45-meter right-of-way along the Project's route, but after this phase and respecting the limits of the towers, it will be possible to do agriculture again, not being possible to plant big trees.</p>
	
<p>Photo 1: Detail of those present at the stakeholder engagement meeting in Lubango (Phase 2 and Phase 4).</p>	<p>Photo 2: Opening of the meeting by the Deputy Administrator for the Technical Area, Orlando José Braz.</p>
	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Questions raised	Responses and Clarifications
<p>Photo 3: Presentation of the Project by Eduardo Ferdinand (Holísticos).</p>  <p>Photo 5: Presentation of Mr. Ernesto Domingos, Coordinator of the Nabungula neighbourhood.</p>	<p>Photo 4: Great Chief (Soba Grande), Tayoka Kalume.</p>  <p>Photo 6: RNT company representatives.</p>

Chapter 5

IMPACT ASSESSMENT AND MITIGATION

MEASURES

5. IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter describes the methodology used to assess the potential environmental and socioeconomic impacts associated with the construction and operation for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango. It also describes the mitigation measures required to minimize, attenuate and/or reduce the potential identified impacts.

5.1. Methodology for Assessment of the Environmental and Social Impacts

In the majority of the environmental and social impact studies, the assessment of the potential environmental and social impacts is accomplished by employing matrices of interactions that correlate the project actions (described in **Chapter 2 – Project Description**), with the environmental and social characteristics or conditions (described in **Chapter 4 – Environmental and Social Baseline**), taking into account the legal requirements (described in **Chapter 3 – Legal Frameworks**). These matrices are used to obtain a quantitative classification of the potential environmental and social impacts and, also, to anticipate the mitigation measures for those significant negative impacts (pre-mitigation). The Residual impacts are assessed beforehand based on the mitigation measures (post-mitigation).

The matrix proposed by Christopher M.R. Pastakia in the Danish Water Quality Institute of Denmark and published under the title “Rapid Impact Assessment Matrix” (RIAM) was chosen and adapted for the development of this Environmental and Social Impact Assessment. It should be noted that this matrix has been used since 1998 in several countries of Europe, Asia, South America, and Africa.

The principle of the RIAM Method is to distribute selected variables into four environmental components with influence on the environment, and on the quality of life of the people under assessment, namely:

- a. **Physical / Chemical (PC):** covers all physical and chemical aspects that may modify the environment, including non-renewable resources, and the physical degradation of the environment. The air and noise quality, the quality of the effluents and wastes to be produced are aspects to be considered in this component.
- b. **Biological / Ecological (BE):** covers all biological and ecological aspects that can modify the environment, including non-renewable resources, impacts on the biodiversity, intra and inter-specific relationships, and the impact of pollution on the ecosystem.
- c. **Social / Cultural (SC):** includes the individual, collective, social, cultural and religious human aspects. Ethnic differences are addressed in this component, as well as religious practices, the cultural structure of local communities, and their habits and customs.
- d. **Economic / Legal (EL):** aims to identify, and quantify the consequences of economic activities, as well as the complexity of the project’s management operations from a legal standpoint, such as: creation of local job opportunities, procurement of local goods and services, power and water consumption, road traffic, protected areas, etc

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

With the inclusion of variables in the four matrix components, the quantification of each variable result in an environmental classification for each component, which is later assessed in an integrated manner. For this assessment, the analysis is divided up into two (groups as listed in **Table 5-1** and **Table 5-2**).

Table 5-1: Group A Environment Component.

A1 – Spatial Scale		A2 – Magnitude of Change	
Score	Classification	Score	Classification
4	International Importance	+3	Major positive change
3	Important to regional/national interests	+2	Moderate positive change
2	Important to areas immediately outside the local condition (Limited to 5 Km of the Project)	+1	Small positive change
1	Important only to the local condition	0	No change in <i>status quo</i>
0	No importance	-1	Small negative change
		-2	Moderate negative change
		-3	Major negative change

Table 5-2: Group B Environmental Component.

	B1 – Permanence	B2 - Reversibility	B3 – Cumulative Effects
Score	Classification	Classification	Classification
1	Short term (0 a 1 year)	No change	No change
2	Short term (1 a 5 years)	Reversible	Non-cumulative / Single
3	Medium term (5 a 15 years)	Irreversible	Cumulative / Synergetic
4	Long term (>15)		
5	Permanent		

The **Environmental Impact Classification (EIC)** calculated for each variable may vary between -132 and +132, being this calculation performed by the use of the formula below:

$$EIC = (A1 \times A2) \times (B1 + B2 + B3)$$









Hence, according to the resulting score and its specific category, it is possible to obtain a description of the importance of the impact caused by the action, given a certain variable of the condition under assessment. The environmental classification with its distinct categories and descriptions according to the impacts is listed below in **Table 5-3**.

Table 5-3: Description of the Categories vs. Impacts.




Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

RIAM Environmental Score (EIC)	Description of the category vs. impacts
84 to 132	Major positive impacts
48 to 83	Significant positive impacts
25 to 47	Moderate positive impacts
13 to 24	Medium Positive impacts
1 to 12	Minor positive impacts
0	No impact
-1 to -12	Minor negative impact
-13 to -24	Medium negative impact
-25 to -47	Moderate negative impact
-48 to -83	Significant negative impact
-84 to -132	Major negative impact

The criteria of importance of the impacts, in an analysis of the assessment result may be described in a summarized and easy to understand form, as listed below:

- 
Major positive impacts: Very significant improvement in the existing condition. Extremely relevant improvement in the status of a resource, or population. Total satisfaction of a predictable/required need in the long run.
- 
Significant positive impacts: A quite significant improvement in the existing condition. Considerable improvement in the status quo of a resource or population. Total satisfaction of a predictable/required need in the medium term.
- 
Moderate positive impacts: Significant improvement in the existing condition. Improvement in the status quo of a resource or population. Partial satisfaction of a required need.
- 
Medium positive impacts: Improvement in the existing condition. Minor improvement in the status quo of a resource, or population. Partial satisfaction of a need.
- 
Minor positive impacts: Minor significant improvement in the existing condition. Very minor improvement in the status quo of a resource or population. Partial satisfaction of a need.
- 
No impact: No recorded impacts on the environment, and on the population.
- 
Minor negative impacts: Impact on resources of little importance, or a low-degree impact. No loss of usage.
- 
Medium negative impacts: Impact on resources of local importance, or a low-degree impact. Changes in usage.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

-  **Moderate negative impacts:** Impact on resources of local and regional importance, or an irreversible medium-degree impact. Loss of usage.
-  **Significant negative impacts:** Impact on resources of regional and national importance, or an irreversible medium-degree impact. Significant loss of usage.
-  **Major negative impacts:** Impact on resources of national and international importance, or an irreversible high-degree impact of major magnitude. Significant loss of usage.

With the RIAM methodology, the intention was to adopt a scale of impacts with a sufficient number of values, to enable the representation and establishment of distinctions between the different conditions under assessment. Therefore, no insignificant differences of the impact value (according to the accuracy of the available information) were introduced, so as to avoid errors in the assessment process.

Other aspects of the impact assessment

The other elements described below were incorporated in the RIAM methodology, in addition to the above-mentioned, to provide for a better assessment of the potential impacts. These additional elements include: the probability, the occurrence of an impact, and the mitigation potential for each project action. All these elements are included in the impact assessment matrices (see **Table 5-4**).

- **Probability**

The impact assessment also took into consideration the probability of impact occurrence. The probability addressed here is associated with the certainty or uncertainty that a specific impact would occur under normal operating conditions (planned events), i.e. the impacts that may result from accidents and incidents (unforeseen events) are outside the scope of this definition. The probability is defined based on the five (5) categories listed in **Table 5-4**.

Table 5-4: Probability Categories.

Assessment	Attributes
Remote (R):	It is unlikely that the impact will occur under normal operating conditions. .
Low (L):	It is most unlikely that the impact will occur, but if so, in only one occasion under normal operating conditions.
Medium (M):	It is likely that the impact will occur, and if so, in various occasions under normal operating conditions.
High (H):	It is very likely that the impact will occur, and if so, in many occasions under normal operating conditions.
Certain (C):	It is certain that the impact will occur under normal operating conditions

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The probability defined in the previous table derives from a set of historical information from similar projects, the sector’s models and data, contributions from stakeholders, and professional interpretation.

- **Impact Occurrence**

Impact occurrence is here defined as the occasion when the impact may be detected. This may vary from an immediate impact to a long-term impact **Table 5-5** presents the assessment of impact occurrence and its attributes.

Table 5-5: Categories of Impact Occurrence.

Assessment	Attributes
I – Immediate	<ul style="list-style-type: none"> • The impact occurs immediately after a project action
I (p) – Immediate periodic	<ul style="list-style-type: none"> • The impact occurs immediately after a project action, however the action associated with the impact is periodic, i.e., it will be observed from time to time, modifying the environment whenever it occurs.
C – Short Term	<ul style="list-style-type: none"> • The impact occurs after a brief period, 0 - 3 months after a project action has been undertaken. Soon after an immediate impact.
M – Medium-term	<ul style="list-style-type: none"> • The impact occurs after a mean period, 3 - 12 months after a project action has been undertaken.
L – Long-term	<ul style="list-style-type: none"> • The impact occurs after a long period, more than 12 months after a project action has been undertaken.
N/A – Not applicable	<ul style="list-style-type: none"> • When there is no change in the <i>status quo</i>.

- **Mitigation Potential**

The mitigation potential is the ability of an impact to be mitigable, maximizable, or compensable. The categories for this potential are listed in **Table 5-6**.

Table 5-6: Categories Mitigation Potential.

Assessment	Attributes
M – Mitigable	<ul style="list-style-type: none"> • The impact can be minimized with the implementation of mitigation measures.
NM – Non-Mitigable	<ul style="list-style-type: none"> • The impact cannot be minimized, i.e., there are no measures that can reduce the magnitude of the impact.
NM (cp) – Non Mitigable, compensable	<ul style="list-style-type: none"> • The impact cannot be minimized, but it can be compensated, with the implementation of compensatory measures.
MM – Maximizable	<ul style="list-style-type: none"> • The impact can be maximized, i.e., added value, but only for positive impacts.

5.2. Identification of the Project’s Main Actions Generating Impacts on the Environment

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The main impacts generated by the DL and substation Project under study occur in the construction phase, where the main interference in terms of soil occupation and the potential affections to existing natural, landscape and socio-economic values occur.

Thus, there is a direct affectation of the area to be occupied in the construction of the supports - more extensive and temporary during the construction phase and more localized and permanent in the operation phase - as well as its surrounding area, corresponding to the protection RoW of the line and support areas allocated to the implementation of worker's camp and temporary access to activities under development. During the operation phase, there is the maintenance of the impacts occurred in the previous phase, regarding permanent land occupation, landscape, interference with land use planning and socio-economic component.

Considering the greater significance of the interferences introduced by the Project during the construction phase, the main activities of the 60 kV distribution line Project likely to cause environmental impacts are systematised below:

- Construction of Arimba substation and installation of worker's camp;
- Machinery and vehicles circulation;
- Establishment of temporary accesses including access roads (noting that this will be minimal due to the fact that there are already access roads in the area);
- Vegetation removal and earth moving (limited to the right-of-way);
- Definition of the protection right-of-way, in which trees likely to interfere with the operation of the distribution line are felled or cut down (the tower sitting will make possible to avoid most of the existing trees);
- Implantation of supports, with a temporary affectation of soil occupation during the construction phase, in a relatively large area of about 8 m x 8 m around each tower (approximately 0.23 hectares), and an irreversible affectation of soil occupation in the exact location of the towers' implantation;
- Digging of holes and construction of the foundation blocks, involving excavation and concreting (5 meters deep).

Although the worker's camp location is subject to approval by the Project Owner/Superintendent it is obliged to comply with the recommendations of the SES Report. It is foreseeable that its construction and operation may cause negative effects on the environment, namely:

- Dust production as a result of earth moving and temporary storage on worker's camp, as well as other land preparation operations;
- Noise emission as a result of worker's camp preparation activities, the movement of vehicles accessing the site and the unloading of equipment and materials;
- Temporary compaction and impermeabilization of the soil, during the period that the worker's camp is in operation;
- Local alteration of the landscape, also during the period of its operation.

5.2.1. Physical Environment

For the Physical Environment and taking into account the specific nature of the Project route and Arimba substation site, some changes in the status quo are anticipated in both phases of the Project, mainly during construction phase. Minor to medium potential negative impacts are anticipated, associated with the dispersion of particulate matter, the emission of gases resulting from the traffic of vehicles (mainly heavy vehicles), as well as noise generation and vibrations.

Climate

- **Potential Impacts**

No impact is expected on the climate, taking into account the activities foreseen for the Project, both in the construction and operational phases.

- **Environmental Impact Assessment and Mitigation Measures**

No impact is expected for this descriptor; therefore, no measures will be proposed.

- **Residual and Cumulative Impacts**

There are no residual impacts for this descriptor. Cumulative impacts are also not expected as there are very few activities taking place under the project that could result in climate change.

Geology and Geomorphology

- **Potential Impacts**

No significant impact is anticipated on this descriptor, taking into account the activities foreseen for the project during construction phase and none for operation phase. Only minor superficial changes in the geomorphology within the construction areas (in some spaces in distribution line route and Arimba substation site), associated with the construction and improvement of access roads, excavations, earthworks along the RoW, terrain modelling and ground levelling for the installation of equipment including the foundations for the towers, worker's camp and substation installations. If not properly managed these activities can lead to soil erosion.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-7 outlines the Impact Assessment anticipated for the Geology and Geomorphology, and its mitigation measures.

Table 5-7: Impact Assessment and Mitigation Measures for Geomorphology.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Changes to the local geomorphology	Local condition, small negative change, permanent, irreversible, single, certain probability, immediate occurrence, non-mitigable	Minor negative impact	Not Applicable (But Long-term impacts of stormwater need to be monitored.)	
Mitigation Measures				
Note: There are no mitigation measures applicable for the anticipated impacts, except for good construction practice to avoid soil erosion such as built-in controls during the construction period with progressive rehabilitation and soil control measures.				

- **Residual and Cumulative Impacts**

Minor Residual impacts are anticipated as a result of ground levelling requirements. No cumulative impacts are expected, except for the construction of the East Lubango Substation.

Soils

Impacts on the soil are expected during the construction phase, such as the soil compaction, pavement for equipment installation and soil contamination (spills of contaminants and incorrect waste disposal). These will result from the cleaning and ground levelling activities, vehicles and machinery traffic between the worker's camp and the sites where the equipment (towers) will be installed, as well as where the worker's camp will be settled. The locations to be paved will be where the new equipment should be installed (mostly foundations for the towers). The paved area for the foundations will occupy an area of approximately 1.44 hectares (20 m x 20m per tower) during construction and 0.23 hectares (8m x 8m per tower) during operation. If not properly managed these activities, particularly the excavations and tower sitting, can lead to soil erosion.

Another potential impact is soil contamination/pollution, being this associated with potential spills of contaminants (hydrocarbons and other contaminants). The spills may occur when filling fuel tanks and reservoirs of machines and equipment, or during the maintenance of vehicles and machinery.

As for the Arimba substation, their implementation implies the continuous occupation of the land where they will be located, in an irreversible manner. The areas to be occupied differ according to whether one considers the construction phase (in which the areas used cover, in addition to the substations implementation areas, entire surrounding areas affected by the construction processes involved) or the operation phase (in which only the substations areas are permanently affected).

Soil Degradation

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

During the construction phase, the construction of access roads, vegetation clearance in the RoW and in Arimba substation site, earthworks, and excavations for tower foundations are the main activities likely to affect soil structure and to cause soil compaction. As a vegetation cover stabilizes the soils and ensures resistance to erosion, the removal of vegetation should be restricted to a minimum possible. The herbaceous and ligneous species that do not represent a risk for the Project should be retained in place and will contribute to maintaining the natural soil stabilization. However, it should be noted that there is very few vegetation in the Project area of influence.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-8 outlines the Impact Assessment anticipated for the Soils, and its mitigation measures.

Table 5-8: Impact Assessment and Mitigation Measures for Soil.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Ground levelling and compaction	Local condition, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Soil waterproofing	Local condition, small negative change, short-term, reversible, single, certain probability, immediate occurrence, non-mitigable	Minor negative impact	Not Applicable	
Mitigation Measures				
<ul style="list-style-type: none"> • Minimize soil exposure during excavations and earth moving in particular during periods of heavy rain to decrease water erosion and transport of solids, concentrate earthworks in the dry season, whenever possible; • Vegetation must be cleared only immediately prior to construction works commencing to minimise the chance of exposing the soils to wind erosion; • The removal of vegetation should be kept to a bare minimum. Trees should be pruned to size, where exclusively necessary, and not removed (no de-stumping); • Prepare and implement erosion and sediment control plans, particularly in areas with high erosion potential; • Accelerated erosion from storm events during construction shall be minimised through managing stormwater runoff (e.g., velocity control measures); • Handling of chemical products should always be carried out in such a way as to minimise the risk of spillage onto the ground, in accordance with the procedures defined in the environmental management plan for the site; • The washing of concrete mixers should preferably be carried out at the concreting plants, thus preventing soil contamination; 				

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
<ul style="list-style-type: none"> • In the case of the electricity line, whenever the construction activities result in surplus soil, namely from the opening of hollows, this should be used to cover the foundations or spread on the ground, after the installation of the foundation blocks, thus minimising the impacts associated with the destruction of soil for the implantation of supports. • Develop and implement an Emergency Response Plan, including recovery techniques for contaminated soils (to be prepared by the contractor); • Fuel and other hazardous substances must be stored in aboveground storage tanks or sealed containers, contained within a bunded area and with sump drainage to capture spills and leaks; • Perform the maintenance of equipment and machinery in appropriate waterproofed sites. The waste that results from this process should be duly stored and forwarded to an environmentally adequate destination; • Perform the maintenance of equipment, machinery, and vehicles used in the construction work, keeping in mind their technical specifications, and operational intensity. • The area affected by an accidental spill (a portion of the soil) must be secured in spill containment kits, and be forwarded to an environmentally adequate destination; • Waterproof the storage and fuel supplying facilities, and generators zones, according to the legislation, and build settling basins to contain potential accidental spills of lubricants and fuels; 				

• **Residual and Cumulative Impacts**

The cumulative impact of soil degradation and contamination during the construction and operation phases of similar projects is not considered to be a significant impact within the region because, in general, not all vegetation is removed from the right-of-way and access roads are designed in a manner so as to avoid erosion. The activities likely to cause such negative effects will be concentrated mostly at worker’s camp and tower’s locations which are located at intervals of 300 m apart and are very easily to mitigate.

The overall footprint of impact within the soil resource presented in the project region, is considered to be of Negligible, with full compliance with the proposed mitigation measures and plans, including training for workers involved in refuelling motor vehicles, generators, mixing chemicals, etc.

There are no known positive impacts relating to the Geology and Geomorphology environment, and the impacts are dominantly related to the construction phase. Cumulative geomorphological impacts related to other projects planned for the surrounding regions are not considered significant, as the impacts of this project are minor and easily mitigated.

Waste

Potential Contamination of Soils Resources

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Soils can be contaminated during the construction phase by soil mixing during the excavation of foundation pits or by accidental hydrocarbons spills from heavy machinery at storage worker’s camp. For all activities involving the use of potential pollutants or hazardous materials, there will be a requirement to ensure that material such as concrete, fuels, lubricants and hydraulic fluids will be carefully handled and stored to avoid spillages. A Waste Management Plan will be implemented during the construction phase, which should reduce the probability of this type of contamination to occur.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-9 outlines the Impact Assessment anticipated for the Soils, and its mitigation measures.

Table 5-9: Impact Assessment and Mitigation Measures for Soil.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Soil contamination (spills of hydrocarbons and other contaminants)	Local condition, small negative change, short-term, reversible, single, high probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Soil contamination (solid waste and effluents)	Local condition, small negative change, short-term, reversible, single, high probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Mitigation Measures				
<ul style="list-style-type: none"> • Certify the Waste Management Plan next to the National Waste Agency, and comply with it. • Waste should be adequately managed, and in compliance with the national legislation, namely Presidential Decree No. 17/13 on Construction and Demolition Waste, and Presidential Decree No. 190/12 on the Regulation of Waste Management. 				

- **Residual and Cumulative Impacts**

No residual and cumulative impacts are anticipated on this descriptor.

Air Quality

- **Potential Impacts**

The construction phase of the distribution line and 60/15kV Arimba substation will include civil works necessary for the establishment of the substation’s equipment, right-of-way, towers, and other

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

associated infra-structures. Project activities that have potential to impact air quality would be associated with construction from emissions of air pollutants from temporary power generators, equipment installation, vehicles and machinery traffic. Construction activities (vegetation removal, earthworks, excavation, soils modelling, and borrow pits) will also generate the emission of particulate matter (dust). Each of these operations has its own duration and potential for dust generation and therefore the extent of dust emissions would vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions along the project areas.

During construction phase the emissions will be released within the footprint of the Project and along access roads such as: emissions of nitrogen oxides (NO₂), carbon monoxide (CO), and sulphur dioxide (SO₂), mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and dust and particulate matter (as PM_{2.5} and PM₁₀) created by construction-related vehicle traffic on unpaved roads. Levels of emissions are likely to be highest during construction, when more machinery will be operating and there will be a need for more vehicle movement into and out of the site in order to supply construction materials and remove waste. During operation, there will be a lower level of vehicle traffic.

Once the distribution line is built and operational and the RoW reinstated, no significant effects on air quality are anticipated. The maintenance activities, and in particular the continued vegetation control along the RoW, will result in some dust emissions and gaseous emissions, due to fuel consumption of light-duty equipment and vehicles used for those maintenance operations, however, the expected air pollutant emissions are to be intermittent and of low intensity. As such, air quality impacts during operations are considered negligible.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-10 outlines the Impact Assessment anticipated for the Air Quality, and its mitigation measures.

Table 5-10: Impact Assessment and Mitigation Measures for Air Quality.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Degradation of the Air Quality (generators operation, vehicles for staff transport, equipment and materials, other machinery)	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence (periodic), mitigable	Medium negative impact	Not Applicable	
Degradation of the Air Quality (excavations,	Local condition, small negative change, short-term, reversible,	Minor negative impact	Not Applicable	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
ground levelling and demolition)	single, high probability, immediate occurrence, mitigable			
Mitigation Measures				
<ul style="list-style-type: none"> • Fuel and other hazardous substances must be stored in aboveground storage tanks or sealed containers, contained within a bunded area and with sump drainage to capture spills and leaks; • Speed limits should be set for construction heavy vehicles. This speed limit should not exceed 30 km/h in critical segments, such as when near residential areas; • All internal combustion machinery and equipment should be kept in good maintenance status to minimize tailpipe emissions. This should include preventive maintenance of machines, equipment, and vehicles, and operator training, as well as internal monitoring program of proper maintenance of vehicles; • Reduce the traffic of heavy vehicles used in the construction work. • Vegetation clearing and earthworks should be minimized as much as possible and limited to the strictly needed areas; • All unpaved surfaces where vehicle movement is to be expected near residential areas should be kept moist (e.g., through a water sprinkler truck), particularly during dry and windy conditions, to minimize the dust emitted by vehicle entrainment; • Heavy trucks transporting granular construction materials (such as sand, soil, and gravel, etc.) should not be loaded to full capacity. A free edge of approximately 0.2 m should be kept, to avoid spills during transportation; • Trucks carrying dusty materials should have the load conveniently covered, preventing the emission of particulate matter and fugitive dusts; • In worker's camp stockpiles of granular materials should be regularly sprinkled with water, to minimize windborne dusts; • Prohibit the incineration/burning, and the disposal on the soil of any type of waste or flammable material in the region where the project should be implemented; • Prior to construction activities undertake an air quality baseline survey to set the benchmark for gases (NO_x, CO, CO₂, and SO₂) and particulate matter (PM_{2.5} and PM₁₀); • Covering internal circulation routes and the area allocated to the construction site with non-powdery material (gravel, gravel, concrete or other); • Defining circulation routes that are as short as possible (taking into account the priority given to distance from residential areas, hospitals, schools, etc.). 				

- **Residual and Cumulative Impacts**

Minor Residual impacts are anticipated for this descriptor, as a result of the emission of combustion/exhaust gases from vehicles and machinery. Minor cumulative impacts are expected due to the normal road traffic along distribution line route as well as some activities taking place in the area including the Omatapalo quarry.

Sound Environment and Vibration

- **Potential Impacts**

During the construction phase, noise will be mainly generated by the operation of construction vehicles and machinery and from the activities carried out in each specific work front, as discussed in sections above. All these construction activities and equipment operation will result in temporary noise emissions with potential annoyances to the community when the construction activities take place in the vicinity of existing settlements. Of the construction activities with the potential to generate impacts on ambient noise, some are clearly noisier, such as earthworks and vegetation clearance. Other activities, such as transportation of materials and the movement of heavy vehicles from the worker's camp to the work sites and back, will still generate noise, but of lower levels. It is also worth noting that some activities are very limited in time and space (such as earthworks and excavation at each tower location) while others will be more continuous (such as the movement of machinery). Low ambient noise levels are expected due to the rural location of the overall corridor. Thus, the noise levels during this phase will also depend on several factors, such as the type, quantity and state of repair of the equipment to be used, construction methods, and worker's camp locations.

Operation maintenance activities will comprise the use of vehicles and the use of occasional heavy vehicles responsible to perform vegetation control along the corridor. These vehicles will generate noise emissions, but it is anticipated that the additional road traffic generated as a result of the project would be minimal and sporadic in nature as there will be very few visits made by maintenance staff.

The values recorded in measurements of **Section 4.1.6** allow us to predict that the implementation of the project will alter the current sound framework only occasionally, periodically and intermittently during the construction and operation phases of the substation and distribution line.

During the operation phase, only a slight increase in noise should be perceptible within the premises of the Arimba substation, resulting from the operation of the transformers.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-11 outlines the Impact Assessment anticipated for sound environment and vibrations, and Mitigation Measures.

Table 5-11: Impact Assessment and Mitigation Measures for Sound Environment and Vibrations.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Increase in the noise levels	Surrounding areas, small negative change, short-term, reversible, single,	Medium negative impact	Not Applicable	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
(Worker's camp activities)	certain probability, immediate occurrence (periodic), mitigable			
Increase in the noise levels (traffic of vehicles and machinery)	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence (periodic), mitigable	Medium negative impact	Not Applicable	
Generation of vibrations (Worker's camp activities)	Surrounding areas, medium negative change, short-term, reversible, single, certain probability, immediate occurrence (periodic), mitigable	Sight negative impact	Not Applicable	
Generation of vibrations (traffic of vehicles and machinery)	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence (periodic), mitigable	Minor negative impact	Not Applicable	
Generation of noise from machineries of substation and work and commuting vehicles	Not applicable		Minor negative impact	Minor negative impact
Mitigation Measures				
<ul style="list-style-type: none"> • Speed limits should be set for construction heavy vehicles. This speed limit should not exceed 40 km/h in critical segments (specially near residential, schools, and hospital areas); • Construction activities, in particular the noisier ones, should be limited to the daytime period only (between 07:00 and 22:00) and to working days, avoiding working during the night-time and on weekends; • The location of the worker's camp should be carefully defined, considering the location of sensitive receptors (houses, hospital, schools, etc.); • Inhabitants of local communities nearby the construction locations should be previously informed by the contractor regarding the upcoming construction activities, including information on the planned start of activities, their nature and duration. This communication should also include information regarding the project nature and goals; • Develop and implement a Grievance Redress Mechanism (GRM), to address complaints related with noise and vibration impacts; 				

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
<ul style="list-style-type: none"> • Perform noise monitoring campaigns during the construction phase of the project in the vicinity of the identified settlements located inside the 50m distribution line and East Lubango and Arimba substation buffer area; • Use soundproof generators or renewable sources, as an alternative to electricity for energy-efficient equipment; • For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order, also that the doors close properly against the seals. • Regular maintenance of vehicles and equipment allocated to the RoW maintenance works. • Regular maintenance of the distribution line and substations components such as insulators, conductors, etc; • Use of personal protective equipment in an adequate manner. • Regular maintenance of machinery of substation 				

- **Residual and Cumulative Impacts**

Residual impacts are anticipated for this descriptor, even with the implementation of mitigation measures in both phases of the project, as a result of the traffic of vehicles, use of machinery and equipment, however of low significance for the current condition of the status quo. No cumulative impacts are expected for this descriptor.

Water Resources (Quality)

- **Potential Impacts**

No permanent water courses with physical expression were identified in the vicinity of the locations planned for the 60 kV DL and implementation of the substation.

During construction activities, water will be required (e.g., cement mixing for the foundations and potable water for workers). At this stage the water will be procured from a contractor, not from river nor wells. Abstraction will be done at rates which do not adversely affect ecological functions and do not impede access to water of existing users.

During both construction and operation phases, wastewater generation in the workers' camp, construction site and at the substation is expected.

- **Environmental impact Assessment and Mitigation Measures**

Table 5-12 outlines the Impact Assessment anticipated for the Water Resources (Quality), and its mitigation measures.

Table 5-12: Impact Assessment and Mitigation Measures for Water Resources (Qualities).

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Contamination of local ground or surface water from Project discharges	Local condition, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Groundwater contamination from early survey works and accidental spills	Local condition, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Wastewater generation	Wastewater from workers' camp and construction site	Minor negative impact	Wastewater from substation	Minor negative impact
Mitigation Measures				
<ul style="list-style-type: none"> • The oily layer that is stored in a suitable container must be sent to an authorized waste operator, who must ensure that the oil's destination prevents contamination of the water environment; • Hydrocarbon separators should be visually inspected weekly, and maintained by removing the oil layer and storing it in an appropriate container whenever it reaches equipment safety level limits, which when a loss of efficiency in the separation of hydrocarbons is detected; • All wastewater from worker's camp activities will be collected and removed from the site for appropriate disposal at a licensed municipal facility; • Installation of watertight septic tanks (or equivalent) to collect wastewater from the site, including effluent from washing vehicles and machinery; • Mobile chemical toilets are to be installed on site if no other ablution facilities are available. These chemical toilets should be installed away from watercourses and provided by an accredited company; • The impermeable surface that forms the basis of the concrete plant should be slightly raised above the surrounding terrain to minimize the entry of clean runoff water into the construction area; • The quality and quantity of effluent streams discharged to the environment including stormwater will be managed and treated to meet the applicable effluent discharge guidelines; • It is forbidden to deposit waste and hazardous materials directly on the ground or on the banks and beds of water courses, the perimeters for protection of water catchments, flood areas, agricultural areas and near dwellings; • Heavy machinery involved in the improvement of access routes should be up to date with services ensuring it is mechanically sound, thereby minimizing the likelihood of oil and/or fuel leaks; • Comply with Angolan legislation regarding concentration limits of discharges into natural water bodies (Annex VI of Presidential Decree no. 261/11 of October 6th); • The dumping and/or storage of construction materials and construction waste which may release particles should be protected from wind and rain (e.g., by blanketing containers or storage areas for materials 				

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
	and/or waste) and should be located as far away as possible from sensitive areas, particularly areas near water courses.			

- **Residual and Cumulative Impacts**

No residual and cumulative impacts are anticipated on this descriptor.

Landscape

- **Potential Impacts**

In general, it can be said that the impacts on the landscape, caused by the construction of this type of infrastructure, are felt with greater intensity in the construction phase. In the operation phase, they are attenuated, as a result of the implementation of mitigation measures, which although they may be minimized, cannot eliminate visual or landscape impacts, given the dimensions of the equipment to be installed as part of the project.

In terms of the landscape, changes are expected to occur during construction phase and medium during operation phase, at the morphological level, vegetation, scenic background and human activities. Although the proposed route to be installed are small (approximately 10 Km), globally, the visual impact of the project for the 60 kV DL will be significant on the landscape.

The more significant impacts on landscape will occur during the construction phase as a result of the vegetation clearance in the RoW, presence of temporary worker’s camp and associated equipment, construction and machinery traffic, earthworks, infrastructures assembly and installation. This impact is a combined effect of several aspects, including:

- Localized alteration of the topography, as a result of the implantation of the supports, which are considered to be of little significance although permanent;
- Occurrence of discontinuities in terms of soil occupation, with negative impact, due to the destruction of vegetation cover and earth movement. These impacts are considered temporary;
- Disruption of the current continuity of the landscape in places where construction activities will take place, of temporary duration;

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Reduction of visibility, even if only temporary, especially during dry season, caused by the increase of dust emissions and its deposition in the areas surrounding the worker’s camp, due to soil movement, considered to be of temporary duration;
- Introduction of external elements to the existing landscape (e.g., construction materials, prefabricated structures, etc.) of temporary duration.

During the operation phase, the overall aesthetic effect of a DL and Arimba substation are likely to be negative to most people, especially where proposed lines would cross natural landscapes. The reduction of landscape quality, visual absorption capacity, and spatial disorganization generate relevant impacts that will remain in the operation phase (distribution line and Arimba substation). In places with potential for visualization, identified in the baseline, the perception of alterations in the landscape resulting from the infrastructure will be higher and the visual impacts may become more significant. Research and experience show that reaction to aesthetic of distribution lines and substation sites differ. Some residents do not notice them or find them objectionable from an aesthetic perspective.

To some, the distribution lines or other utilities may be viewed as part of the infrastructure necessary to sustain everyday lives and activities and are therefore acceptable. To others, new distribution line may be viewed in a positive way as they are associated with economic development.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-13 outlines the Impact Assessment anticipated for the Landscape, and its mitigation measures.

Table 5-13: Impact Assessment and Mitigation Measures for Landscape.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Changes in the landscape (Physical presence of the yard that supports the construction work)	Local condition, small negative change, short-term, reversible, single, high probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Changes in the landscape (New equipment)	Not Applicable		Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate	Medium negative impact

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
			occurrence (periodic), mitigable	
Mitigation Measures				
<ul style="list-style-type: none"> • Vegetation clearing, topsoil removal, and earthmoving activities should be minimized as much as possible and limited to the strictly needed areas; • All temporary construction sites, such as borrow pits and landing areas, and any other areas disturbed by construction, will be revegetated immediately following the completion of the construction activities. Use native species for the rehabilitation works; • Only areas that are already highly disturbed should be used for the establishment of worker’s camp and/or laydown areas; • Worker’s camp, laydown areas and machinery parks should be located as far as possible (minimum distance of 300 m) from any areas of sensitive use (residential areas, schools, and health units); • Tree planting or other forms of screening where it might be feasible to mitigate impacts on visual receptors at specific viewpoints/routes. 				

- **Residual and Cumulative Impacts**

No residual and cumulative impacts are anticipated on this descriptor.

5.2.2. Biotic Environment

For the Biological and Ecologic component is predicted some negative impacts on habitats, vegetation, flora and fauna. According to data from the survey carried out, the major ecosystems to be crossed by the distribution line do not have considerable biodiversity as they are already changed due to human activities. To clear a ROW for the project infrastructure, it will not be necessary to remove any relevant vegetation.

For fauna, the expected negative impacts are related to the destruction of food and shelter areas, and the risk of collision of birds. However, the bird life in the area is very limited due to the already changed environment. Arimba substation will be installed near the Poaires village with several alterations in its natural ecosystem due to various anthropic activities.

Habitats, Vegetation and Flora

- **Potential Impacts**

These direct impacts are the results of tree and shrub vegetation removal to clear in the ROW (particularly close to the East Lubango Substation), install the infrastructure and carry out regular maintenance, and along that strip no tree regeneration whose height may compromise the safety of

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

the distribution lines is allowed. There will be no need to improve the accesses in the area as the line will run parallel to existing roads and paths. There will be very limited vegetation loss in the DL route and in the Arimba substation site no significant changes are expected to occur as the area is already significantly changed.

Fragmentation or loss of flora and habitats

The Project construction will result in the loss and/or fragmentation of flora through the clearing of vegetation in the RoW (24 m), construction worker's camp and access roads, and may cause fragmentation or loss to vegetation outside the work areas through negligent behaviour of contractors, such as driving off roads, and starting fires, etc. The earthworks, and circulation of vehicles will allow the dispersion of air pollutants (particulate matter). The dust is deposited on the surface of plant leaves, covering them and preventing the absorption of solar energy, as well as the absorption of carbon dioxide (CO₂) and the release of oxygen (O₂), thus limiting their photosynthetic capacity.

The impacts associated with the construction of the tower's infrastructure are not expected to be detrimental to flora, i.e., areas to be affected are very small (not more than 3 hectares) considering the full length of DL and localised/confined (besides, the towers will be at a distance of 300 m from each other).

Indirect degradation of vegetation units and habitats

In construction and operation phases, maintenance operations include vegetation control in the RoW, which will limit the recovery of vegetation within this corridor. Frequent maintenance operations will also contribute to expansion of ruderal and invasive flora species. Due to the need to maintain the service strip under the line (6 m) there will be habitat fragmentation due to the presence of the RoW.

The removal of vegetation will cause very little modification of the local habitats, however some fragmentation might be caused by construction activities. This indirect impact will occur along the entire length of the DL, particularly in the vegetation towards the end of the distribution line.

Construction activities and transportation of equipment and workers potentially facilitate the introduction of exotic and/or invasive species. The implementation of behaviours that avoid this introduction, such as checking and cleaning the transport vehicles and machinery that will carry out the work so that they do not transport plant material between the various regions where the project is implemented, can minimise and prevent the introduction of invasive alien species. Construction and operation works have the potential to result in negative impacts on unique floral and/or faunal species in sensitive habitats.

Although habitat fragmentation is difficult to mitigate, during the vegetation removal process, some mitigation measures should be applied, such as minimizing vegetation removal, small readjustments on the distribution line route and planting trees campaigns, only indigenous species, throughout project areas. The construction activities, transportation of equipment and workers, has the potential to facilitate the introduction of exotic and/or invasive species. The implementation of preventive behaviours that avoid the introduction of exotic species, such as checking and cleaning transport

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

vehicles and machines that will be used during construction work, can prevent and/or minimizing the probability of its occurrence.

In general, the impacts on habitats, flora and vegetation during the operation phase will result from the line's maintenance works along the 3-meter-wide maintenance corridor. It is foreseeable that, in the medium and long term, there may be occasional negative impacts resulting from the felling of trees that have grown in the safety and maintenance strip or in the protection zone next to the supports, and which, due to their size, put the line at risk by violating safety distances.

- **Impact Assessment and Mitigation Measures**

Table 5-14 describes the Impact Assessment anticipated for Habitats, Vegetation and Flora.

Table 5-14: Impact Assessment and Mitigation Measures for Habitats, Vegetation and Flora.

Impact	Environmental Impact Classification			
	Construction Phase		Construction Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Vegetation removal	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Habitat Fragmentation, loss of biodiversity and change in light conditions	Surrounding areas, moderate negative change, long-term, reversible, single, great probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Introduction of exotic species	Surrounding areas, medium negative change, long-term, reversible, single, great probability, immediate occurrence, mitigable	Minor negative impact	Not Applicable	
Mitigation Measures				
<ul style="list-style-type: none"> • Vegetation clearing should be minimized as much as possible and limited to the strictly needed areas; • Whenever possible new and temporary accesses should be created based in existent accesses; • The areas selected to be subjected to vegetation removal should be previously marked with visible marks (e.g. coloured tapes), allowing for the identification of the intervention areas, thus facilitating the work of machinery operators and avoiding cutting vegetation that may be maintained. These operations should be as careful as the ecological or landscape interest of the vegetation formation considered; • The actions that cause negative impacts on flora and vegetation should be reduced to the minimum during the construction of the DL and the installation of access roads and worker's camp sites; • Distribution line route readjustments where possible and applicable; 				

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Construction Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
<ul style="list-style-type: none"> Prevent the unnecessary destruction of habitat trees, e.g. dead trees and old specimens. Cavity and bark dwelling faunal species utilize these trees, namely various geckos, snakes, bats, genets, etc.); Tree planning and replantation and other forms of screening where it might be feasible. Create nurseries with seedlings of plants that are endemic to the project region and threatened by Angola, which can be used to recover the areas deforested for the installation of the worker’s camp, in order to maintain the natural characteristics of the region and because they are better adapted to the environment and are therefore easier to maintain and develop in the short term; To ensure compliance with the waste management techniques proposed in the Waste Management Plan for the project; At the end of the construction work, the original physical structure of all affected areas should be restored. In the areas to be recovered, the land should be left in conditions favourable to natural re-vegetation and, whenever necessary, indigenous species of grass should be used; 				

• **Residual and Cumulative Impacts**

The residual impacts for this descriptor are related with the change in ecosystem structure and how flora will respond to the changes of the project implementation. The cumulative impacts are related to the increasing pressure on ecosystems, the project implementation will raise this pressure.

Fauna

• **Potential Impacts**

In terms of fauna, Project potential impacts will be focused on the avian populations within the development area and near surrounds. The main impacts relate to habitat loss associated with the construction activities, resulting in displacement from breeding and foraging areas, and habitat degradation. There are also indirect impacts associated with changes to ecosystem and biophysical processes. During operation, there is the potential for bird strikes to occur along the distribution line.

Reduction of feeding, breeding and roosting areas

In construction and operation phases, clearance of vegetation and maintenance operations around the RoW, which will limit the recovery of vegetation within this corridor, and frequent maintenance operations will also contribute to the destruction of the feeding points, breeding and roosting areas for fauna species, especially for birds and mammals. Species that depend on trees will be especially affected, such as tree frogs, reptiles, rodents, and bats that use the inside of trees as roosts; but also several tree nesting birds species (most of the small birds, nocturnal birds, and raptors, among others); and even bigger mammals that roost in trees, like monkeys. Very few feeding areas will be lost by the limited vegetation clearance. In addition, since the vegetation clearance strip is narrow, animals should be able to feed in similar nearby areas and there is very little vegetation in the right-of-way.

Increased fauna mortality and decreased species diversity

Vegetation clearance will lead to death of some animals, potential decreasing species diversity in the project area. Organisms that are sessile during the day and roost in trees, such as bats, tree frogs and reptiles, will most likely be affected, since these animals typically don't leave roosting sites during the day. As such, these will not escape and therefore will die during vegetation removal activities. Also birds that nest in trees (including eggs and chicks) and especially nocturnal ones, in what concerns adult birds, that are less vigilant during the day, can die during these activities. An increase in machinery, vehicles movements, and light will also lead to a high risk of run over. Animals that move slower, like reptiles and amphibians, are typically the most affected by this impact, because they have difficulties in moving away rapidly and are also difficult to detect by drivers.

In operation phase, the DL and East Lubango and Arimba substations are expected to have no or negligible direct negative impacts on amphibians, reptiles and terrestrial mammals. Towers will be widely spaced across the landscape and the wires are unreachable for ground-dwelling species. In contrast, the direct impact of powerlines on bird communities is relatively well-known. Birds can find it difficult to see overhead power lines, particularly in situations of bad weather, causing fatal collisions, while the wingspan of larger species might make them bridge the gap between two parallel lines, resulting in electrocution. The collision risks are difficult to assess and depend on several factors, such as the species present and their ecological behaviour, the landscape features and the power lines' technical characteristics. For example, the risks are higher for night flyers, for species that migrate at low altitudes, large birds in general and species that fly fast and congregate in large flocks in situations of reduced visibility.

- **Impact Assessment and Mitigation Measures**

Table 5-15 describes the Impact Assessment anticipated for Fauna.

Table 5-15: Impact Assessment and Mitigation Measures for Fauna.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Destruction of refuges and/or feeding areas	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not applicable	
Collision for birds	Not applicable		Local, moderate negative change, long-term, reversible, single, certain probability, immediate occurrence, mitigable	Medium negative impact

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Mitigation Measures				
<ul style="list-style-type: none"> • Limit the movement of machines and vehicles to work areas. Limit habitat fragmentation or loss outside site boundaries; • Prevent the unnecessary destruction of habitat trees, e.g. dead trees and old specimens. Cavity and bark dwelling faunal species utilize these trees, namely various geckos, snakes, bats, genets, etc.); • Implement and maintain road rules with maximum speed limits (e.g., 40 km/h), as this would result in fewer animal road mortalities as well as less associated dust emissions. Temporary speed humps could also be used to limit the speed at which people travel; • The felling of trees must be properly planned, especially in the case of large native species, and must be authorised in advance by the Environmental Officer from the Surveillance team; • Avoid off-road driving and unnecessary night-time driving in the area, as this often results in the destruction of slow-moving reptiles and mammals, particularly nocturnal species; • In the event of receiving confirmation of regular bird strikes along the distribution line (based on the ongoing monitoring activities), the installation of high-visibility markers should be considered to make the line more visible to birds, to reduce the risk of collision; 				

• **Residual and Cumulative Impacts**

The residual and cumulative impacts for this descriptor are related with the change in ecosystem structure and, probably, in the food chain in the areas of the DL routes, and how fauna will respond to the changes of the project implementation.

Ecosystem Services

• **Potential Impacts**

Although the proposed DL route and Arimba substation are not expected to negatively impact most of the recognised ecosystem services within the Huila Province (see **Chapter 4, Section 4.2.8.**), some along the DL route could potentially be affected if not addressed adequately during all stages of Project development. These ecosystem services are namely: cultivated crops, transhumance space, watercourses, landscape, wildlife, cultural services, etc.

The impact from towers infrastructure is not expected to be significantly detrimental to ecosystem services as the total footprint of towers is relatively small (including 300 m distance from each tower) and not expected to impact services, especially if the proposed mitigation measures are followed.

The impact associated with the implementation of the substations in rural area are not expected to be detrimental to ecosystem services. The development footprint at these substation’s sites are relatively small, it is associated in areas with profound anthropic changes in their surroundings, and not expected

to impact any ecosystem services around. None of the identified ecosystem services is exclusively associated with the proposed development areas and the Project footprint areas are not expected to contribute to major ecosystem services loss, if the proposed mitigation measures are implemented properly.

- **Environmental Impact Assessment and Mitigation Measures**

Table 5-16 describes the Impact Assessment anticipated for Ecosystem Services.

Table 5-16: Impact Assessment and Mitigation Measures for Ecosystem Services.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Loss of ecosystem services	Surrounding areas, small negative change, short-term, reversible, single, certain probability, immediate occurrence, mitigable	Minor negative impact	Not applicable	
Mitigation Measures				
<ul style="list-style-type: none"> • Same applicable mitigation measures for flora and fauna are expected; 				

- **Residual and Cumulative Impacts**

The residual and cumulative impacts for this descriptor are related with the temporary change in ecosystem structure and, probably, in the food chain in the areas of the DL routes.

5.2.3. Social and Cultural Component

Negative and positive impacts are anticipated for this component. The negative impacts are associated with potential discomforts/dissatisfaction on the local community, due to the potential power outages, and the increase in noise during construction activities. Impacts on the health of employees and population are also anticipated, namely the risk of work accidents (maintenance of energized equipment). The positive impacts are associated with manpower requirements, and the improvement of power supply by the public power network in the region. No impacts are anticipated on the historical or cultural aspects as the area is devoid of such elements.

Social Aspects

- **Potential Impacts**

The project implementation may result in changes in the sound environment and vibrations, which may cause discomfort/dissatisfaction for the surrounding residents (if the case) and passers-by.

However, this impact will occur primarily during the construction phase, where there should be an increase in activities with potential for noise generation, such as the circulation of vehicles and heavy machinery for the transportation of equipment and materials. Small impact is expected for the DL sections that will be closer to population and houses.

It should be noted that there is also a potential for affecting the health of employees and population resulting from the risk of accidents at and during work in the construction phase. This may be mitigated by the implementation of adequate health and safety plans, and procedures for maintenance activities to be carried out, among others.

Common impacts in the construction phase, such as increase in road accidents, conflicts with local habits and customs, among others, are not expected to occur due to the fact that the workforce, both for construction and operation, is relatively low and it is expected hire locally. At this stage of the Project the specific locations of the towers and need for access roads have not yet been fully defined. The topographic surveys will also enable aligning the routes so as to avoid and/or minimize any physical resettlement or economic displacement. After the topographic surveys are undertaken, at a later stage, the probability of land acquisition, physical displacement or economic displacement will be provided with more detailed information. In case there will be land acquisition, physical resettlement or economic displacement as result of the final distribution line routes, a Resettlement Action Plan and/or a Livelihood Restoration Plan will be developed by ENDE.

Impacts related to potential power outages and failures in power supply are anticipated, as a result of the integration of the new equipment. These may result in the temporary dissatisfaction of the communities affected by these power outages/failures. Although this impact can be minimized with the implementation of a communication plan. On the contrary, after the construction/installation, with the energized overhead power lines, its operational activity will be noticeable, which could be a source of satisfaction for the current consumers, as well as new future consumers. Although a small workforce is to be expected during the construction and operational phases, this will foster the decrease (very low levels) of unemployment locally.

- **Impact Assessment and Mitigation Measures**

Table 5-17 describes the Impact Assessment anticipated for the Social Aspects and mitigation measures.

Table 5-17: Impact Assessment and Mitigation Measures for the Social Aspects.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Discomfort/dissatisfaction of the neighbouring residents (construction and overall operations - noise generation, vibrations)	Surrounding areas, small negative change, short-term, reversible, cumulative, high probability, immediate occurrence (periodic), mitigable	Minor negative impact	Local condition, no change to status quo	No impact
Impact on the health of workers (construction and overall operations- noise generation, vibrations, risk of work accidents, and maintenance of the equipment) and local people	Local condition, small negative change, short-term, reversible, single, medium probability, immediate occurrence, mitigable	Minor negative impact	Local condition, small negative change, short-term, reversible, single, low probability, immediate occurrence, mitigable	Minor negative impact
Dissatisfaction of the affected communities (Potential power outages during the installation of new equipment, unfair treatment among local people in terms of land use and local resources distribution) Harrasment by workers to local women, child labor	Regional condition, small negative change, short-term, reversible, single, certain probability, immediate occurrence (periodic), mitigable	Minor negative impact	Not applicable	
Farmland loss	Implementation of physical structures and transport line support infrastructures	Minor negative impact	Not applicable	
Risk of electrocution, burns and fire	Not applicable		Local condition, small negative change, reversible, single, low probability, immediate occurrence (periodic), mitigable	Minor negative impact
Fulfilment of the communities affected by the Distribution Line,	Not applicable		Regional condition, major positive change, long-term, reversible,	Significant positive impact

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Public Lightning and Home Connections			synergistic, certain probability, immediate occurrence (periodic), maximizable	
Reduced unemployment (manpower requirements)	Local condition, small positive change, short-term, reversible, single, certain probability, immediate occurrence, maximizable	Minor positive impact	Local condition, positive change, long-term, reversible, single, certain probability, immediate occurrence, maximizable	Minor positive impact
Mitigation Measures				
<ul style="list-style-type: none"> • Whenever possible, and keeping in mind the needs of the construction work, and the qualification of the manpower, give preference to the local and neighbouring population when recruiting manpower, to help reduce the levels of local unemployment. • Raise environmental awareness among employees, so as to drastically reduce waste generation, and even promote the reuse of wastes to the full extent possible. • Signal and fence adequately the Worker’s camp zones, and all access routes to the construction site. • Develop and implement a health and safety at the workplace plan. Spread of infectious diseases among workers and local people must be avoided. • Harrassment to local women by workers must be prevented. Education program for workers are needed. • Child labor must be prevented. • The staff engaged in the project must comply with all the good practices of road safety, and attend training classes on defensive driving. • Develop and implement a social responsibility and communication plan for the project. 				

• **Residual and Cumulative Impacts**

No residual impacts are anticipated. Cumulative impacts are expected, as a result of risk for the health of neighbouring residents, risk of electrocution, burns and fire.

Historical and cultural aspects

• **Potential Impacts**

During the fieldwork was not mapped any fossils, archaeological and paleontological sites along the DL route neither near the Arimba substation area. No impacts are anticipated for this descriptor, according to the activities foreseen and the baseline for historical and cultural aspects.

- **Impact Assessment and Mitigation Measures**

No impacts are anticipated for this descriptor.

- **Residual and Cumulative Impacts**

There are no residual and cumulative impacts for this descriptor.

5.2.4. Economic and Legal Component

Negative and positive impacts are anticipated for the Economic and Legal Component; being the positive impacts associated with the search for goods and services, improvement in income, increase in the transformation/conversion and distribution capacity of the public power network; and the negative impacts associated with the overload of road infrastructures and waste generation. Positive impacts relating to the compliance with the national legislation, and the social development policies of the Angolan Government are also anticipated.

Economic Framework

- **Potential Impacts**

At the macro level, the Project is intended to result in increased electrical capacity in Lubango (Huíla province capital), which is expected to contribute to the regional and national economy. Beyond these macro level impacts, the Project is expected to generate positive impacts on the local economy and employment conditions throughout its lifecycle (around 40 years). The primary impacts are expected during the construction phase through the creation of temporary local and regional employment opportunities (opportunities will be given to the local youth) and the creation of long-term benefits associated with capacity enhancement of local labour through on-the-job training.

Opportunities for economic development and diversification may also result from the use of local facilities and procurement of goods and services during the construction phase, in particular for water supply, waste management facilities, food products or catering services, telecommunications services (internet) and security for the worker's camp, etc. To a lesser extent, the operation phase will generate some limited longer-term local employment opportunities mainly for maintenance and monitoring activities, especially the line route.

The economic impact of Project workforce spending in the local economy is expected to be small, since the worker's camp will provide food and other services for the workers. However, due to the cultural

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

variety of the workers should be expected to generate some income for local shops, bars, restaurants and cafés and other existing formal businesses in the service sector.

Finally, the Project will require potable water for the worker’s camp as well as water for construction activities. It is expected that the Project will contract a private water supplier. Similarly, solid waste will also be generated during construction and from the worker’s camp. Waste generated in the worker’s camp will be disposed of at appropriately licensed landfill sites in the region. The Project may also contract the security services, and services of a local catering company to provide food to the different worker’s camp. As such, the use of local waste facilities and the services of a local water supplier and catering company may contribute to the creation of local economic development and diversification opportunities for the construction period (8 months).

In operation phase, the primary impact associated with the Project is expected to be the long-term employment of local workforce for maintenance of the infrastructure and the DL footprint corridor and monitoring activities for the DL. Once construction is over, operation of the DL and substations will be handed over to ENDE as the line operator. Although the exact size of the workforce needed for the operation phase is not clear at this stage, recruitment is not expected to be extensive. ENDE is a state company therefore hiring may be limited as ENDE may not need to hire any additional workers. The maintenance and monitoring of the line are expected to require a higher skill level while vegetation clearance of the 5 m of DL footprint corridor will require unskilled workforce.

- **Impact Assessment and Mitigation Measures**

Table 5-18 describes the Impact Assessment foreseen for the Economic Framework, and its mitigation measures.

Table 5-18: Impact Assessment and Mitigation Measures for the Economic Framework.

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Improvement of the household income	Local condition, small positive change, short-term, reversible, single, certain probability, immediate occurrence, maximizable	Minor positive impact	Local condition, small positive change, short-term, reversible, single, certain probability, immediate occurrence, maximizable	Minor positive impact
Revitalization of the local economy	Regional condition, small positive change, short-term, reversible, single, certain probability,	Minor positive impact	Regional condition, small positive change, short-term, reversible, single, certain probability, short-term	Minor positive impact

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Impact	Environmental Impact Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
	short-term occurrence, maximizable		occurrence, maximizable	
Mitigation Measures				
<ul style="list-style-type: none"> • Develop a Local Employment Plan for the construction phase. This plan should include a hiring procedure to ensure that local people (both women and men) from the study area are employed wherever possible, and that this is done in a fair, consistent and transparent manner by the contractor. The Plan should ensure that women and people with disabilities benefit equally. Workers from the communities along the TL will be given priority for low-skilled jobs. • Develop a Local Procurement Plan for the construction phase. As part of the tendering process, the contractor should develop a purchasing strategy, stipulating how the local purchase of goods and services will be undertaken (e.g., construction materials from quarry operation located in the vicinity of the study area, waste management and disposal, water supply, catering, etc.), to maximize local procurement. This plan should ensure the equal and effective participation of women and men in the procurement board; All workers should be adequately trained for the proper performance of their functions; • The EPC should work with the local Sobas to advertise all vacancies in ways that are accessible to the local communities and explain to both women and men how they can benefit from the project for them to be economically empowered; • Job creation efforts should be accompanied by protection of the fundamental rights of workers, in accordance with the requirements set out in the national labour law (Law no. 7/15 of 15 June), and JICA Guidelines for Environmental and Social Conditions; • Ensure the prohibition of the employment of child labour or forced labour; • Formalise all employment contracts in writing, specifying working and payment conditions. 				

• **Residual and Cumulative Impacts**

Residual impacts of little significance are anticipated, resulting from the overload of the road infrastructures. Cumulative impacts are expected to be minor and will be as result of the existing economic conditions and development plans for the Arimba commune.

Legal Framework

• **Potential Impacts**

Regarding the Legal Framework, no impacts are anticipated on protected species of the fauna and flora, given that the predicted negative impacts of the project are between minor to moderate it is unlikely to affect greatly the vulnerable and endangered species found in the project area, however, mitigation measures should be applied no minimize these risks. No protected areas by the national legislation in force are found near the project areas. On a regional level, it is important to point out that the project

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

will comply with the objectives of the Angola Energia 2025 strategy, taking on important social and economic significance, associated with the increase in the power distribution and transformation/conversion capacity of the national power network.

- **Impact Assessment and Mitigation Measures**

Table 5-19 outlines the Impact Assessment foreseen for the Legal Framework.

Table 5-19: Impact Assessment and Mitigation Measures for the Legal Framework.

Impact	Environmental Classification			
	Construction Phase		Operational Phase	
	Impact Assessment	Final Classification	Impact Assessment	Final Classification
Compliance with Angola Energia 2025	Not applicable		Regional condition, moderate positive change, long-term, reversible, synergistic, certain probability, immediate occurrence, maximizable	Significant positive impact
Mitigation Measures				
Note: There are no mitigation measures applicable for this descriptor.				

- **Residual and Cumulative Impacts**

No Residual impacts are anticipated for this descriptor.

Table 5-20: Environmental Impact Assessment Matrix for construction and operational phases for the Project.

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE									OPERATIONAL PHASE								
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification			
			A1	A2	B1	B2	B3	CA				A1	A2	B1	B2	B3	CA			
PHYSICAL COMPONENT																				
Climate	Construction activities and operation of new equipment	No impact	0	0	0	0	0	0	N/A	N/A	N/A	0	0	0	0	0	0	N/A	N/A	N/A
Geology and Geomorphology	Excavations, earthworks, and modelling of the soil	Changes to the local geomorphology (distribution line route)	1	-1	5	3	2	-10	C	I	NM	Not Applicable (But Long-term impacts of stormwater need to be monitored.)								
Soil	Cleaning, earthworks, ground levelling, traffic of vehicles and machinery, implementation of the Worker's camp, and structures used in	Ground levelling and compaction	1	-1	2	2	2	-6	C	I	M	Not Applicable								

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE						OPERATIONAL PHASE											
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures								
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification	Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential
A1	A2	B1	B2	B3	CA				A1	A2	B1	B2	B3	CA						
	effluents on the soil																			
Water Resources (Quality)	Construction activities and operation of vehicles	Contamination of local ground or surface water from Project discharges	1	-1	2	2	2	-6	C	I	M	1	-1	4	1	1	-6	L	L	M
Air Quality	Generators' operation, vehicles (to transport, staff, equipment and materials), and other machinery (emission of exhaust gases from engines). Excavations, ground levelling	Degradation of the Air Quality (increase in the concentration of atmospheric pollutants, namely: particulate matter, heavy metals, NOx, CO, among others)	2	-1	2	2	3	-14	C	I (p)	M	Not Applicable								

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE									OPERATIONAL PHASE								
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification			
A1	A2	B1	B2	B3	CA	A1	A2	B1	B2	B3	CA									
	Excavation, levelling and structure demolition		2	-1	2	2	2	-12	C	I (p)	M	Not Applicable								
Sound/noise and Vibrations	Activities in Worker's camp, traffic of vehicles and machinery	Increase in the noise levels	2	-2	2	2	2	-24	C	I (p)	M	Not Applicable								
	Traffic of vehicles and machinery		2	-1	2	2	3	-14	C	I (p)	M	Not Applicable								
	Structure demolition activity	Generation of vibrations	1	-1	1	2	2	-5	C	I (p)	M	Not Applicable								
	Traffic of vehicles and machinery		2	-1	1	2	3	-12	C	I (p)	M	Not Applicable								
	Operation of machineries of substation and	Generation of noise	Not Applicable									1	-1	4	1	1	-6	L	L	M

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE									OPERATIONAL PHASE								
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification			
			A1	A2	B1	B2	B3	CA				A1	A2	B1	B2	B3	CA			
	work and commuting vehicles																			
Landscape	Physical presence of the yard that supports the construction work	Changes in the landscape	2	-1	2	2	2	-12	C	I	M	Not Applicable								
	New equipment		Not Applicable									2	-1	4	2	3	-18	C	I	M
ECOLOGIC AND BIOLOGICAL COMPONENT																				
Habitats, Vegetation and Flora	Construction activities, and operation of new equipment	Vegetation removal	2	-1	1	2	3	-12	L	I	M	0	0	0	0	0	0	N/A		
		Habitat fragmentation, loss of biodiversity and change in light conditions	2	-1	1	2	3	-12	L	I	M	Not applicable								
		Construction activities	Introduction of exotic invasive species	2	-1	2	2	2	-12	L	I	M	Not applicable							

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE									OPERATIONAL PHASE								
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification			
			A1	A2	B1	B2	B3	CA				A1	A2	B1	B2	B3	CA			
Overall construction activities (noise generation, vibrations, risk of work accidents), and maintenance of the equipment	Impact on workers' health	1	-2	2	2	3	-14	L	I	M	1	0	1	0	0	0	-36	H	I(p)	
Potential power outages during the installation of new equipment	Dissatisfaction of the affected communities	2	-1	1	2	2	-10	C	I (p)	M	Not Applicable									
Implementation of physical structures and distribution line support infrastructure	Farmland loss	1	-1	2	2	2	-6	C	I	M	Not Applicable									
	Risk of electrocution, burns and fires	Not Applicable									1	-1	4	2	3	-9	L	I	M	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Descriptors	Project Activities and Pressure Exerted on the Environment	Potential Impact	CONSTRUCTION PHASE									OPERATIONAL PHASE									
			Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	Environmental classification of the project without mitigation measures						Impact Probability (without mitigation measures)	Impact Occurrence	Mitigation Potential	
			Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				Importance	Magnitude	Permanence	Reversibility	Cumulative Effect	Environmental Classification				
			A1	A2	B1	B2	B3	CA				A1	A2	B1	B2	B3	CA				
	New equipment installed and in operation	Fulfilment of the communities affected	Not Applicable										3	2	4	2	3	54	C	I	MM
	Manpower requirements	Decrease in unemployment	2	1	2	2	2	12	C	I	MM		2	1	4	2	2	16	C	I	MM
Historical and Cultural Aspects	Construction activities, and operation of new equipment	No Impact	0	0	0	0	0	0	N/A				0	0	0	0	0	0	N/A		
ECONOMIC AND LEGAL COMPONENT																					
Economic Framework	Creation of (direct and indirect) job posts	Improvement of the household income	2	1	2	2	2	12	C	I	MM		1	1	4	2	2	8	C	I	MM
	Search for raw materials, goods and services, equipment, construction materials, and	Revitalization of the local economy	3	1	2	2	2	18	C	C	MM		3	1	4	2	2	24	C	L	MM

Chapter 6

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

6. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environmental and Social Management Plan (ESMP) is an instrument that provides the project with an efficient structure that ensures the execution and control of the actions planned in various programs, the adequate environmental condition of the construction work, as well as control of the information, and preservation of a high-quality standard in the construction and operation of the 60 kV DL between East Lubango and Arimba substation. This ESMP encompasses a set of plans that propose a variety of measures and actions that must be applied during the construction and operation of the project. These plans will stimulate the improvement of the quality of life in the social, environmental, cultural and economic dimensions.

The ESMP is comprised of, in addition to the (mandatory) Impact Monitoring and Follow-Up Program proposed in **Table 6-1** for the mitigation measures and goals, and in **Table 6-2** for the environmental management plan, and in **Table 6-3** for the environmental monitoring plan. Other programs and plans, which due to the nature of the project, and the potential impacts described in **Chapter 5**, recommend that it should be developed and implemented by ENDE and EPC. The plans and programs proposed in this ESMP are as follows:

- Waste Management Plan;
- Traffic Management Plan;
- Occupational Health, Safety and Environment Program (to be developed by the EPC);
- Construction Management Plan (to be developed by the EPC);
- Local Procurement Plan (to be developed by the EPC);
- Emergency Preparedness & Response Plan (to be developed by the EPC).

Other plans could be required either by the Angolan authorities or based on the JICA Guidelines for Environmental and Social Considerations (April 2010).

6.1. Environmental and Social Management Plan

In order to comply with the environmental legislation in force, namely the Presidential Decree no. 117/20 of 22nd April and Executive Decree no. 92/12 of 1st March, the Environmental and Social Management Plan aims to provide the essential elements to mitigate the potential negative impacts arising from the construction and operation phases of the Project and is based on the information in the chapters regarding the Project description, the institutional and legal framework, the environment and social baseline, as well as the potential negative impacts identified.

According to the environmental impact assessment carried out, the descriptors that could be subject to more significant habitat fragmentation or loss and that are compatible with the justification of the implementation of the Environmental and Social Management Plan (ESMP) correspond to: Soil, Air Quality, Water Resources, Noise, Vibration and Radiation, Landscape, Flora and Fauna (birds), Social and cultural.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

The ESMP presented in **Table 6-1**, **Table 6-2** and **Table 6-3** aim to assist in the implementation of mitigation measures in the different phases of the Project. It determines the type of intervention, the responsibility of each party involved, as well as the deadline for implementation of each activity. The recommendations of the mitigation measures and those contained in this ESMP will be extremely important for future environmental audits of the Project as well as to ensure that the impacts in question are insignificant. The measures described in the table below include only those applicable to descriptors whose impacts were classified as low to moderate-high, not being represented those whose potential impacts are insignificant or negligible, after the implementation of a given mitigation measure.

- **Table 6-1** presents the mitigation measures and goals pertinent to the entire project phase.
- **Table 6-2** presents the environmental management plan pertinent to the pre-construction, construction and operation phases.
- **Table 6-3** presents the environmental monitoring plan for the pre-construction, construction and operation phases corresponding to JICA's requirement as the joint implementation of the project with RNT.

This ESMP must be ensured and followed-up by a technical team from ENDE and EPC (person in charge for the environmental issues), who can take on the following duties:

- Assess the performance and progress in the implementation of mitigation measures and their Impact Monitoring and Follow-Up Program;
- Ensure the adaptability and feasibility of the mitigation measures in time and space, obtaining as such, where deemed necessary, financial and human resources from the company management team;
- Disclosure information on the enterprise, and its social and environmental impacts, recording and responding to any complaints or allegations from the surrounding population, and Government administrative authorities;
- Follow-up and facilitate potential (either internal or external) environmental audits that may be performed throughout the implementation of the project;
- Prepare regular environmental and social progress reports and submit them to the National Institute for Environmental Management (INGA).

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Table 6-1: Environmental and Social Management Plan for entire project phase

Item	Mitigation Measures	Goal	Correspondence with JICA item
< Pre-construction and Construction Phases >]			
1.	Progressive rehabilitation and soil control measures	Avoid soil erosion	Geology and Geomorphology Water quality
2.	Perform the maintenance of equipment and machinery in appropriate waterproofed sites. The waste that results from this process should be duly stored and forwarded to an environmentally adequate final destination.	Avoid contamination of the soil.	Soil contamination
		Avoid dissemination of the contamination, so as not to reach underground water streams.	Soil contamination Water quality
3.	Develop an Emergency Response Plan including recovery techniques for contaminated soils.	Reduce the extent of soil contamination as a result of spills of contaminants.	Soil contamination
4.	The area affected by an accidental spill (a portion of the soil) must be secured in spill containment kits, and be forwarded to an environmentally adequate final destination.	Recover contaminated soils.	Soil contamination
		Avoid dissemination of the contamination.	Soil contamination
5.	Waterproof the storage and fuel supplying facilities, and generators zones, according to the legislation, and build settling ponds/basins to contain potential accidental spills of lubricants and fuels.	Containment of potential accidental spills.	Soil contamination
		Avoid the contamination of soils.	Soil contamination
6.	Certify the Waste Management Plan next to the National Waste Agency, and comply with it.	Comply with the legislation, and avoid potential contamination risks, as a result of inadequate waste management including wastewater.	Soil contamination Water quality Waste
7.	Select a site adequate for the disposal of construction waste. These should be adequately managed, and in compliance with the national legislation, namely Presidential Decree No. 17/13 on Construction and Demolition Waste, and Presidential	Avoid soil contamination due to the inadequate management of waste from the distribution line construction and Worker's camp activities.	Soil contamination Waste

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Item	Mitigation Measures	Goal	Correspondence with JICA item
	Decree No. 190/12) on the Regulation of Waste Management.	Avoid dissemination of the contamination, so as not to reach underground water streams.	Soil contamination Waste Water quality
		Avoid the occurrence of disease outbreaks, as a result of inadequate management of the project waste.	Waste Infectious diseases such as HIV/AIDS
		Ensure that the waste generated is correctly managed, to avoid air degradation, particularly organic waste (generation of odors), and particulate matter (emission of dust).	Waste Odor
8.	Adequately store/secure the residual and construction materials, including the inert waste, and other materials, to avoid being blown by the wind.	Reduce the dispersion of particulate matter in the construction site.	Air quality Waste
		Ensure a secure work environment for workers.	Work environment
9.	Prohibit the incineration/burning, and the disposal on the soil of any type of waste or flammable material in the region where the project should be implemented.	Inexistence of focal points of burning waste in open air. Avoid the degradation of the air quality, and soil contamination.	Air quality Soil contamination
		Reduce the probability of species retreating.	Ecosystem
		Avoid disrupting relationships of the local community.	Air quality
10.	Perform the maintenance of equipment, machinery, and vehicles used in the construction work, keeping in mind their technical specifications, and operational intensity.	Avoid an increase in the generation of harmful gases (minimum emission of CO ₂ and CO from the machinery, taking into account the model and	Air quality

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Item	Mitigation Measures	Goal	Correspondence with JICA item
		specifications of the manufacturer).	
		Reduce the probability of an increase in the noise generation and vibrations from machineries and equipment.	Noise and vibration
11.	Prior to construction activities undertake an air quality baseline survey for gases (NOx and CO) and particle matter (PM2.5 and PM10).	To set the benchmark for the air quality in the area.	Air quality
12.	Use soundproof generators or renewable sources, as an alternative to electricity for energy-efficient equipment.	Avoid noise generation.	Noise and vibration
13.	Activities that may produce higher levels of noise should be performed during daylight.	Avoid noise generation during more sensitive periods (night-time).	Noise and vibration
		Reduce noise discomfort on the local community.	Noise and vibration
14.	Reduce the traffic of heavy vehicles used in the construction work.	Reduce the deterioration of living environment related to the noise on the local community	Noise and vibration
		Reduce road overload	Existing social infrastructure and services
15.	Monitor the noise near the main sources of noise (e.g. generators and heavy machinery).	Verify if the noise levels are within the reference values. If not, measures should be adopted to ensure that these do not affect the surrounding community.	Noise and vibration
16.	Remove all structures used during the construction work after its completion.	Minimize visual interference of the structures being built.	Existing social infrastructure and services Landscape

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Item	Mitigation Measures	Goal	Correspondence with JICA item
17.	Realignment of the distribution line.	Minimize visual impact of the structures being built.	Ecosystem Resettlement Landscape
		Reduce vegetation removal for distribution line installation.	Ecosystem
		Minimize interference with wildlife.	Ecosystem
18.	Tree planning and replantation and other forms of screening where it might be feasible.	Minimize visual and wildlife impact of the structures being built.	Ecosystem Resettlement Landscape
19.	No hunting will be allowed in the project area and its vicinity.	Minimize interference and impact on wildlife.	Ecosystem
20.	Raise project workers awareness of the need to comply with the rules of good conduct, and social coexistence, particularly as regards the potential transmission of contagious diseases.	Limit the influence of workers on the local community.	Infectious diseases such as HIV/AIDS Gender
		Avoid or reduce conflicts between workers and the neighbouring population.	Local conflicts of Interest Gender
21.	Whenever possible, and keeping in mind the needs of the construction work, and the qualification of the manpower, give preference to the local and neighbouring population when recruiting manpower, to help reduce the levels of local unemployment.	Reduce conflicts with the local population.	Local conflicts of interest
		Value and empower the local community.	Local economy such as employment and livelihood means
		Reduce the local unemployment levels.	Local economy such as employment and livelihood means Gender Children's rights
22.	Raise environmental awareness among employees, so as to drastically reduce waste generation, and even promote the reuse of wastes to the full extent possible.	Reduce the pressure of waste generation on the environment.	Waste Existing social infrastructure and services
23.	Signal and fence adequately the Worker's camp zones, and all access routes to the construction site.	Reduce the likelihood of accidents that involve staff not working in the construction site.	Accident
24.	Develop and implement a health and safety plan at the workplace.	Reduce the likelihood of work accidents.	Work environment (including work safety)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Item	Mitigation Measures	Goal	Correspondence with JICA item
		Ensure a safe work environment for the workers and visitors.	Work environment (including work safety) Accident
25.	Develop and implement a social responsibility and communication plan for the project.	Ensure the flow of critical information with the local community during the work to be performed. Keep the population accurately informed of the project, mainly as regards those periods with potential power outages.	Resettlement Land use and utilization of local resources Misdistribution of benefits and damages Gender Children's rights Local conflicts of interest
26.	Develop and implement a Traffic Management Plan to rationalize the traffic of heavy vehicles used in the construction work and to ensure the safety of all road users as well as the workers at the project site.	Minimize the likelihood of traffic accidents to ensure there are zero car accidents.	Existing social infrastructure and services Local conflicts of interest Work environment (including work safety) Accident
<Operation Phase>			
27.	Setting speed limits for the vehicles (60 kV distribution line, Arimba substation))	Reduce noise and vibration generation	Noise and vibration
28.	Consideration of the need to install anti-collision devices (60 kV distribution line)	Prevention of bird collisions on distribution line	Ecosystem
29.	Soil control measures (Arimba substation)	Avoid soil erosion	Geology and Geomorphology
30.	Waste (including wastewater from substation) should be adequately managed, and in compliance with the national legislation, namely Presidential Decree No. 17/13 on Construction and Demolition Waste, and Presidential Decree No. 190/12) on the Regulation of Waste Management. (Arimba substation)	Avoid negative impact due to the inadequate management of waste.	Water quality Waste Odors
31.	Perform the maintenance of equipment and machinery appropriately. (Arimba substation)	Reduce the probability of an increase in the noise generation and	Noise and vibration

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Item	Mitigation Measures	Goal	Correspondence with JICA item
		vibrations from machineries and equipment.	

Table 6-2: Environmental and Social Management Plan

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
60kV distribution line between Arimba SS and East Lubango SS						
Pre-construction phase						
1	Air pollution	<ul style="list-style-type: none"> - Air pollutant emissions from the implementation of demining work 	<ul style="list-style-type: none"> - Appropriately maintain the equipment and vehicles used and reduce the generation of air pollutants. - During demining work, water will be sprayed as necessary to prevent dust generation. - Reduce speed on unpaved access roads to prevent dust generation. 	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management and operation, and special cost is not required.
2	Water pollution	<ul style="list-style-type: none"> - Generation of wastewater in workers' camp, etc. 	<ul style="list-style-type: none"> - All effluent from worker quarters etc. is collected and treated from the site for proper disposal at an approved municipal facility. - Installation of watertight septic tanks (or equivalent) to collect waste water from the site, including vehicle and machinery washing waste water. - When mobile chemical toilets are used, they should be installed and collected by an approved contractor and disposed of properly. - When discharging wastewater into the environment, Angolan legislation on wastewater standards (Annex VI of Presidential Decree No 261/11 of 6 October) shall be complied with. 	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management and operation, and special

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						cost is not required.
		<ul style="list-style-type: none"> - Mine and UXO exploration and clearance operations, resulting in muddy run-off 	<ul style="list-style-type: none"> - In sections where clearing and rooting has been carried out due to demining work, ROWs, construction roads, material storage areas and post-service management roads should be promptly secured to prevent sediment run-off. - If the location of the tower and ROW are determined and there is concern about the impact on surface water, well water, spring water, etc., appropriate measures should be taken in consultation with the users. 	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost.
3	Soil pollution	<ul style="list-style-type: none"> - Spills of lubricating oil, fuel oil, etc. from heavy machinery. 	<ul style="list-style-type: none"> - Ensure that lubricants and fuel oils are properly managed and have containers available to catch spills when refilling. 	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost.
4	Noise and vibration	<ul style="list-style-type: none"> - Noise and vibration caused by the implementation of demining work 	<ul style="list-style-type: none"> - Appropriately maintain and manage the equipment and vehicles used to reduce noise and vibration. 	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
5	Offensive odors	<ul style="list-style-type: none"> - Generation of odours due to improper waste management. 	<ul style="list-style-type: none"> - Proper transport of waste and dumping of waste into designated disposal facilities by licensed contractors to avoid the build-up of odour, pest control problems, general rubbish and other nuisance sources on the site. - Provide training, education and signage to ensure compliance with waste management plans. 	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost.
6	Waste	<ul style="list-style-type: none"> - Cutting and de-rooting result in plant bodies becoming waste. - Waste is generated in the workers' camp. 	<ul style="list-style-type: none"> - Plants are not discarded, but are used for soil retention and surface cover to prevent soil erosion and also encourage regeneration where possible. - Waste management plans prepared for power utilities are applied mutatis mutandis to properly dispose of waste generated at workers' camp. 	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost.
7	Ecosystems	<ul style="list-style-type: none"> - Selection of distribution line ROW and tower construction sites 	<ul style="list-style-type: none"> - Although the area is already well developed, the tower construction point and ROW will be finalised based on the detailed design and the results of the geological and topographical survey carried out by the Contractor, confirming the presence of valuable plants and communities such as miombo woodland. 	Consultant	ENDE	Proper planning and designing will be taken by consultants without special cost.
		<ul style="list-style-type: none"> - Clearing and rooting through the implementation of demining work 	<ul style="list-style-type: none"> - Areas targeted for deforestation or logging operations should be marked in advance with visible markers (e.g. coloured tape) so that intervention areas can be identified, facilitating 	CND	Consultant / ENDE/CND	Proper planning and

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<p>the work of machine operators. These operations should be carried out carefully, taking into account the ecological or landscape benefits of vegetation formation.</p> <ul style="list-style-type: none"> - Prompt transition and linkage to transmission line construction works, based on soil erosion prevention measures and vegetation restoration plans, to prevent soil erosion and promote rapid vegetation recovery. 			designing will be taken by consultants without special cost.
8	Land acquisition and resettlement	- Selection of distribution line ROW and tower construction sites	- Avoid private land and used land area as much as possible, based on the detailed design and the results of the geological and topographical survey carried out by the Contractor, the tower construction sites and ROW are finalised.	Consultant	ENDE	Included in the Consultancy Services
			<ul style="list-style-type: none"> - Provide alternative agricultural land and houses of equal or greater value. - Provide a preliminary explanation to the inhabitants of the area concerned. 	ENDE	ENDE	ENDE
9	Existing social infrastructures and services	- Impact on social services of demining work	<ul style="list-style-type: none"> - Enforce access restrictions, etc. around mine exploration and clearance operation sites. - Provide information on the scope of impact and publish the work schedule 	CND	Consultant / ENDE/CND	Included in the cost of demining work
10	Working environment (including occupational safety)	- Accidents and injuries to operators caused by explosions of mines and UXO	<ul style="list-style-type: none"> - Continue to educate operators and ensure that they know the procedures and who to contact to prevent accidents and injuries. Ensure that operators are given instructions on first aid as stipulated in the SOPs, in case of an accident. - Ensure safety measures for workers (e.g. wearing protective clothing and proper equipment maintenance). 	CND	Consultant / ENDE/CND	Included in the cost of demining work
11	Accidents	- Conduct demining work	- Carry out safety checks and take accident prevention measures such as prohibiting access to the area and traffic until the process is complete.	CND	Consultant / ENDE/CND	Included in the cost of

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<ul style="list-style-type: none"> - Provide safety measures for operator / workers engaged in demining work (e.g. wearing protective clothing and proper equipment maintenance). 			demining work
Construction phase						
1	Air pollution	<ul style="list-style-type: none"> - Emission of air pollutants (SO_x, NO_x and others) and generation of dust due to the operation of heavy machinery in the construction of transmission line ROW, construction roads and the construction of towers, and the passage of construction vehicles. 	<ul style="list-style-type: none"> - Appropriately maintain and manage the equipment and vehicles used and reduce emissions of air pollutants (SO_x, NO_x and others). - Construction vehicle traffic routes are supposed to bypass the vicinity of residential areas hospitals, schools, etc., and where unavoidable, speed limits are limited to 30 km/hour or less. - On unpaved roads, water is sprayed by sprinkler trucks as necessary to reduce dust generation. - When transporting earth, sand, etc., do not fill the load fully, but cover it with plenty of room. - Effectively educate and train relevant personnel. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
2	Water pollution	Generation of wastewater in workers' camp, etc.	<ul style="list-style-type: none"> - All effluent from worker quarters etc. is collected and treated from the site for proper disposal at an approved municipal facility. - Installation of watertight septic tanks (or equivalent) to collect wastewater from the site, including vehicle and machinery cleaning waste water. - When mobile chemical toilets are used, they should be installed and collected by an approved contractor and disposed of properly. - When discharging wastewater into the environment, Angolan legislation on wastewater standards (Annex VI of Presidential Decree No 261/11 of 6 October) shall be complied with. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						cost is not required.
		Muddy run-off due to maintenance of distribution line ROW and construction roads	<ul style="list-style-type: none"> - In sections where clearing and rooting has been carried out due to demining work, ROWs, construction roads, material storage areas and post-service management roads should be promptly secured to prevent sediment run-off. - If the location of the tower and ROW are determined and there is concern about the impact on surface water, well water, spring water, etc., appropriate measures should be taken in consultation with the users. 	Contractor	Consultant / ENDE	Proper planning and designing will be taken by consultants without special cost.
3	Soil pollution	Lubricating oil and fuel oil leaks from construction vehicles, construction machinery, etc.	Properly maintain vehicles and heavy equipment and, in particular, store and control lubricants and fuel oil, etc. at the workers' filling stations.	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
4	Noise and vibration	Noise and vibration caused by the operation of heavy	<ul style="list-style-type: none"> - Avoid residential areas, schools, hospitals and other neighbourhoods when selecting worker accommodation. - Construction activities, especially noisy ones, should be limited to daytime only and avoided at night and on weekends. 	Contractor	Consultant / ENDE	Measures can be taken through

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
		machinery and the passage of construction vehicles.	<ul style="list-style-type: none"> - Construction vehicle traffic routes are supposed to bypass the vicinity of residential areas hospitals, schools, etc., and where unavoidable, speed limits are limited to 30 km/hour or less. - Contractors need to present preliminary information to local residents in the vicinity of the construction site on upcoming construction activities, including information on the commencement of planned activities, their nature and duration. This communication should also include information on the nature and objectives of the project. - Implement a grievance redress mechanism (GRM) to address complaints about noise and vibration impacts. 			standard, careful management and operation, and special cost is not required.
5	Offensive odors	Generation of odours due to improper waste management.	<ul style="list-style-type: none"> - Proper transport of waste and dumping of waste into designated disposal facilities by licensed contractors to avoid the build-up of odour, pest control problems, general rubbish and other nuisance sources on the site. - Provide training, education and signage to ensure compliance with waste management plans. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
6	Waste	Improper storage, handling and disposal of general and hazardous waste.	<ul style="list-style-type: none"> - Implement a Waste Management Plan (WMP) to establish waste management priorities and hierarchy. - WMPs also include the proper management, treatment and disposal of toilet and domestic wastewater. - Train employees on storage methods, waste handling, prevention of leakage/disposal and what to do in the event of 	Contractor	Consultant / ENDE	Measures can be taken through standard,

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<p>a leakage, and provide them with the personal protective equipment necessary for handling hazardous waste.</p> <ul style="list-style-type: none"> - Train employees to recycle and reuse waste materials such as glass, iron, steel, wood, cardboard paper and plastic as much as possible. - Develop spill response and emergency response plans that incorporate the potential for accidental release of hazardous waste. 			careful management and operation, and special cost is not required.
7	Ecosystems	Post-vegetation clearing and rooting of vegetation	<ul style="list-style-type: none"> - Backfilling of surface soil. - Strictly prohibit the collection of trees and hunting by workers. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
8	Land acquisition and resettlement	<ul style="list-style-type: none"> - Temporary and permanent acquisition of private land and used land area - Restrictions on access to and land use of construction sites and their surroundings 	- Provide assistance to the project affected persons in the transition period	ENDE	ENDE	ENDE
			- Explain the progress to the residents of the area concerned with regard to the implementation of access restrictions around the construction site, and handle complaints as necessary.	Contractor	Consultant / ENDE	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
9	Land use and utilization of local resource	- Restrictions on access to and land use of construction sites and their surroundings	- Explain the progress to the residents of the area concerned and handle complaints as required.	ENDE	ENDE	ENDE
			- Enforce access restrictions around construction sites	Contractor	Consultant / ENDE	Included in the Contractor's contract
10	Existing social infrastructures and services	- Increase in traffic accidents, etc.	- Provide education on compliance with traffic rules, traffic signage and safe driving - Provide training on safe vehicle operation	Contractor	Consultant / ENDE	Included in the Contractor's contract
11	Misdistribution of benefits and damages	- Temporary and permanent acquisition of private land and used land area - Restrictions on access to and land use of construction sites and their surroundings	- Explain the progress to the residents of the area concerned and handle complaints as required.	ENDE	ENDE	ENDE
			- Enforce access restrictions around construction sites	Contractor	Consultant / ENDE	Included in the Contractor's contract
12	Local conflicts of interest	- Temporary and permanent acquisition of private land and used land area - Restrictions on access to and land use of construction sites and their surroundings. - Conflicts between migrant workers and local residents	- Explain the progress to the residents of the area concerned in line with the stakeholder engagement plan. - Establish a grievance mechanism to handle complaints as required.	ENDE	ENDE	ENDE
			- Provide instructions to personnel and workers from outside and ensure that local communities are well taken care of.	Contractor	Consultant / ENDE	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
13	landscape	<ul style="list-style-type: none"> - Tree felling in the ROW - Establishment of labour camps - Entry of heavy machinery, set up of material storage area 	<ul style="list-style-type: none"> - Minimise the extent of logging where possible and plant trees after construction is completed. - In labour camps and material storage areas, use bare land wherever possible and keep sufficient distance from residential areas and public facilities (schools and hospitals). - Temporary structures should be removed and restored to their original state as soon as construction is completed. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
14	Gender	<ul style="list-style-type: none"> - Harassment by personnel and workers from outside 	<ul style="list-style-type: none"> - Explain the progress to the residents of the area concerned and handle complaints as required. 	ENDE	ENDE	ENDE
			<ul style="list-style-type: none"> - Provide instructions to personnel and workers from outside to ensure the code of conduct, including a ban on harassment of local people. - Respect local culture and take into account local women's views while actively listening to them. - Provide employment opportunities for women and support local trading activities. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
15	Children's rights	<ul style="list-style-type: none"> - Possibility of child labour and inappropriate work by minors. 	<ul style="list-style-type: none"> - Explain the progress to the residents of the area concerned and handle complaints as required. 	ENDE	ENDE	ENDE
			<ul style="list-style-type: none"> - Ensure employment compliant with the law and prohibition of minors' school attendance. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
16	Infectious diseases such as HIV/AIDS	<ul style="list-style-type: none"> - Spread of infectious diseases due to influx of construction workers, etc. 	<ul style="list-style-type: none"> - Provide instructions on health and hygiene to construction workers - Ensure that routine precautionary measures are taken, such as washing hands and gargling. - Regularly disinfect labour camps and construction site offices. - Encourage immunisations and keep medicines always available in labour camps and construction site offices 	Contractor	Consultant / ENDE	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
17	Working environment (including occupational safety)	- Accidents and injuries to workers caused by explosions of mine and UXO	<ul style="list-style-type: none"> - Prohibit prior entry by construction workers to areas other than those where demining work is completed and safety is confirmed by the Government of Angola - Educate workers and make sure they know the procedures and local contacts - If mines or UXO are found, suspend construction work and not resume until the safety of construction workers is confirmed. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
			<ul style="list-style-type: none"> - If mines or UXO are found, demining work is to be carried out. - Ensure instructions on first aid as stipulated in the SOPs in the event of an accident. - Ensure safety measures for workers (e.g. wearing protective clothing and proper equipment maintenance). 	CND	Consultant / ENDE/CND	Included in the cost of demining work
		<ul style="list-style-type: none"> - Accidents at construction sites. - hygiene problem 	<ul style="list-style-type: none"> - Manuals on occupational accident prevention (including safety education and training) should be prepared and thoroughly implemented. - Provide safety equipment - Ensure that cranes and other lifting equipment use is below the expected weight. - Maintenance checks and proper checking of lifting equipment - Use of equipment and devices to prevent electrical shock. - Establish medical posts in labour camps and conduct regular health check-ups. - Fire precautions are taken and fire extinguishers etc. are deployed at the site office and labor camps. - Keep medical supplies and lifesaving equipment always available and installed in labour camps and construction site offices. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
18	Accidents	- Accidents caused by explosions of mine and UXO	- Inform the public about the procedures of demining work when they are found, and contact details, and post them near the construction site at all times.	Contractor	Consultant / ENDE	Included in the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<ul style="list-style-type: none"> - If mine or UXO are found, suspend construction work and not resume the construction work until the safety of construction workers and the surrounding population is confirmed. 			Contractor's contract
			<ul style="list-style-type: none"> - If mine or UXO are found, carry out demining work. - Take measures such as traffic restrictions to ensure safety in the vicinity. - Take measures to prevent accidents, such as prohibiting entry and traffic in the vicinity until the demining work is completed. 	CND	Consultant / ENDE/CND	Included in the cost of demining work
		<ul style="list-style-type: none"> - Traffic accidents due to increased traffic volume 	<ul style="list-style-type: none"> - Provide education on compliance with traffic rules, traffic signage and safe driving. - Provide training on safe vehicle operation. - Carry out regular inspections and maintenance of equipment and instruments. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
Operation phase						
1	Noise and vibration	<ul style="list-style-type: none"> - Noise and vibration caused by the passage of related vehicles. 	<ul style="list-style-type: none"> - Standardise speed limits and passing routes for the vehicles concerned. 	ENDE	ENDE	ENDE
2	Ecosystems	<ul style="list-style-type: none"> - Birds striking power lines. 	<ul style="list-style-type: none"> - Monitoring between East Lubango substation and Arimba substation, and if birds are observed striking transmission lines, consider wearing markers to increase the visibility of transmission lines and ground lines. 	ENDE	ENDE	ENDE
Arimba Substation						
Pre-construction phase						
1	Air pollution	<ul style="list-style-type: none"> - Air pollutant emissions from the implementation of demining work 	<ul style="list-style-type: none"> - Appropriately maintain the equipment and vehicles used and reduce the generation of air pollutants. - During demining work, water will be sprayed as necessary to prevent dust generation. 	CND	Consultant / ENDE/CND	Measures can be taken through standard,

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						careful management and operation, and special cost is not required.
2	Water pollution	<ul style="list-style-type: none"> - Generation of wastewater in workers' camp, etc. 	<ul style="list-style-type: none"> - All effluent from worker quarters etc. is collected and treated from the site for proper disposal at an approved municipal facility. - Installation of watertight septic tanks (or equivalent) to collect wastewater from the site, including vehicle and machinery washing waste water. - When mobile chemical toilets are used, they should be installed and collected by an approved contractor and disposed of properly. - When discharging wastewater into the environment, Angolan legislation on wastewater standards (Annex VI of Presidential Decree No 261/11 of 6 October) shall be complied with. 	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management and operation, and special cost is not required.
3	Soil pollution	<ul style="list-style-type: none"> - Lubricating oil and fuel oil leaks from heavy machinery 	<ul style="list-style-type: none"> - Properly store and manage lubricants and fuel oils, etc., and provide containers to catch spills when refilling. 	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						management and operation, and special cost is not required.
4	Noise and vibration	- Noise and vibration caused by the implementation of demining work	- Appropriately maintain and manage the equipment and vehicles used to reduce noise and vibration.	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management and operation, and special cost is not required.
5	Offensive odors	- Generation of odours due to improper waste management.	- Proper transport of waste and dumping of waste into designated disposal facilities by licensed contractors to avoid the build-up of odour, pest control problems, general rubbish and other nuisance sources on the site. - Provide training, education and signage to ensure compliance with waste management plans.	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						and operation, and special cost is not required.
6	Waste	- Waste is generated in the workers' camp.	- Waste management plans prepared for power utilities are applied mutatis mutandis to properly dispose of waste generated at workers' camp.	CND	Consultant / ENDE/CND	Measures can be taken through standard, careful management and operation, and special cost is not required.
7	Ecosystems	- Fragmentation and loss of habitats for flora and fauna, especially reptiles, due to the implementation of demining work	- After the completion of mine/UXO search and clearance activities, the topsoil is returned and the surface is flattened/smoothed to limit the effects of erosion during rainfall.	Consultant	ENDE	Proper planning and designing will be taken by consultants without special cost

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
8	Topography and geology	- Surface soil erosion from the implementation of demining work	- Installation of sandbags and sedimentation ponds to prevent sediment run-off, if necessary.	CND	Consultant / ENDE/CND	Proper planning and designing will be taken by consultants without special cost
9	Existing social infrastructures and services	- Impact on social services of demining work	- Enforce restrictions on entry and other measures in the vicinity of mine exploration and clearance operation sites. - Provide information on the scope of impact and publish a work schedule	CND	Consultant / ENDE/CND	Included in the cost of demining work
10	Working environment (including occupational safety)	- Accidents and injuries to operators caused by explosions of mines and UXO	- Continue to educate operators and ensure that they know the procedures and who to contact to prevent accidents and injuries. Ensure that operators are given instructions on first aid as stipulated in the SOPs, in case of an accident. - Ensure safety measures for workers (e.g. wearing protective clothing and proper equipment maintenance).	CND	Consultant / ENDE/CND	Included in the cost of demining work
11	Accidents	- Conduct demining work	- Carry out safety checks and take accident prevention measures such as prohibiting access to the area and traffic until the process is complete. - Provide safety measures for operator / workers engaged in demining work (e.g. wearing protective clothing and proper equipment maintenance).	CND	Consultant / ENDE/CND	Included in the cost of demining work
Construction phase						
1	Air pollution	- Emissions of air pollutants (SO _x , NO _x and others) and dust emissions due to the	- Ensure proper maintenance of equipment and vehicles used and reduce emissions of air pollutants (SO _x , NO _x and others).	Contractor	Consultant / ENDE	Measures can be taken

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
		operation of heavy machinery and the passage of construction vehicles during the construction of access roads and substations	<ul style="list-style-type: none"> - Construction vehicle traffic routes are supposed to bypass the vicinity of residential areas hospitals, schools, etc., and where unavoidable, speed limits are limited to 30 km/hour or less. - On unpaved roads, water is sprayed by sprinkler trucks as necessary to reduce dust generation. - When transporting earth, sand, etc., do not fill the load fully, but cover it with plenty of room. - Effectively educate and train relevant personnel. 			through standard, careful management and operation, and special cost is not required.
2	Water pollution	- Generation of wastewater in workers' camp, etc.	<ul style="list-style-type: none"> - All effluent from worker quarters etc. is collected and treated from the site for proper disposal at an approved municipal facility. - Installation of watertight septic tanks (or equivalent) to collect wastewater from the site, including vehicle and machinery washing wastewater. - When mobile chemical toilets are used, they should be installed and collected by an approved contractor and disposed of properly. - When discharging wastewater into the environment, Angolan legislation on wastewater standards (Annex VI of Presidential Decree No 261/11 of 6 October) shall be complied with. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
3	Soil pollution	- Lubricating oil and fuel oil leaks from construction vehicles, construction machinery, etc.	- Properly maintain vehicles and heavy equipment and, in particular, store and control lubricants and fuel oil, etc. at the workers' filling stations.	Contractor	Consultant / ENDE	Measures can be taken through

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						standard, careful management and operation, and special cost is not required.
4	Noise and vibration	<ul style="list-style-type: none"> - Noise and vibration caused by the operation of heavy machinery and the passage of construction vehicles. 	<ul style="list-style-type: none"> - Avoid residential areas, schools, hospitals and other neighbourhoods when selecting worker accommodation. - Construction activities, especially noisy ones, should be limited to daytime only and avoided at night and on weekends. - Construction vehicle traffic routes are supposed to bypass the vicinity of residential areas hospitals, schools, etc., and where unavoidable, speed limits are limited to 30 km/hour or less. - Contractors need to present preliminary information to local residents in the vicinity of the construction site on upcoming construction activities, including information on the commencement of planned activities, their nature and duration. This communication should also include information on the nature and objectives of the project. - Implement a grievance redress mechanism (GRM) to address complaints about noise and vibration impacts. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
5	Offensive odors	<ul style="list-style-type: none"> - Generation of odours due to improper waste management. 	<ul style="list-style-type: none"> - Proper transport of waste and dumping of waste into designated disposal facilities by licensed contractors to avoid the build-up of odour, pest control problems, general rubbish and other nuisance sources on the site. 	Contractor	Consultant / ENDE	Measures can be taken through standard,

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						careful management and operation, and special cost is not required.
6	Waste	<ul style="list-style-type: none"> - Improper storage, handling and disposal of general and hazardous waste. 	<ul style="list-style-type: none"> - Implement a Waste Management Plan (WMP) to establish waste management priorities and hierarchy. - WMPs also include the proper management, treatment and disposal of toilet and domestic wastewater. - Train employees on storage methods, waste handling, prevention of leakage/disposal and what to do in the event of a leak, and provide them with the personal protective equipment necessary for handling hazardous waste. - Train employees to recycle and reuse waste materials such as glass, iron, steel, wood, cardboard paper and plastic as much as possible. - Develop spill response and emergency response plans that incorporate the potential for accidental release of hazardous waste. 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful management and operation, and special cost is not required.
7	Ecosystems	<ul style="list-style-type: none"> - Air pollution, noise and vibration caused by the operation and passage of construction vehicles 	<ul style="list-style-type: none"> - (Same as air pollution, noise and vibration mitigation measures.) 	Contractor	Consultant / ENDE	Measures can be taken through standard, careful

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						management and operation, and special cost is not required.
8	Topography and geology	<ul style="list-style-type: none"> - Soil erosion from land clearance, foundation works, etc. 	<ul style="list-style-type: none"> - Installation of sandbags and sedimentation ponds to prevent sediment run-off, if necessary. 	Contractor	Consultant / ENDE	Proper planning and designing will be taken by consultants without special cost
9	Existing social infrastructures and services	<ul style="list-style-type: none"> - Increase in traffic accidents, etc. 	<ul style="list-style-type: none"> - Provide education on compliance with traffic rules, traffic signage and safe driving. - Provide training on safe vehicle operation. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
10	Landscape	<ul style="list-style-type: none"> - Establishment of labour camps - Entry of heavy machinery, set up of material storage area 	<ul style="list-style-type: none"> - In labour camps and material storage areas, use bare land wherever possible and keep sufficient distance from residential areas and public facilities (schools and hospitals). - Temporary structures should be removed and restored to their original state as soon as construction is completed. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
11	Gender	<ul style="list-style-type: none"> - Harassment by personnel and workers from outside 	<ul style="list-style-type: none"> - Explain the progress to the residents of the area concerned and handle complaints as required. 	ENDE	ENDE	ENDE

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<ul style="list-style-type: none"> - Provide instructions to personnel and workers from outside to ensure the code of conduct, including a ban on harassment of local people. - Respect local culture and take into account local women's views while actively listening to them. - Provide employment opportunities for women and support local trading activities. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
12	Children's rights	- Possibility of child labour and inappropriate work by minors.	- Explain the progress to the residents of the area concerned and handle complaints as required.	ENDE	ENDE	ENDE
			- Ensure employment compliant with the law and prohibition of minors' school attendance.	Contractor	Consultant / ENDE	Included in the Contractor's contract
13	Infectious diseases such as HIV/AIDS	- Spread of infectious diseases due to influx of construction workers, etc.	<ul style="list-style-type: none"> - Provide instructions on health and hygiene to construction workers - Ensure that routine precautionary measures are taken, such as washing hands and gargling. - Regularly disinfect labour camps and construction site offices. - Encourage immunisations and keep medicines always available in labour camps and construction site offices 	Contractor	Consultant / ENDE	Included in the Contractor's contract
14	Working environment (including occupational safety)	- Accidents and injuries to workers caused by explosions of mine and UXO	<ul style="list-style-type: none"> - Prohibit prior entry by construction workers to areas other than those where demining work is completed and safety is confirmed by the Government of Angola - Educate workers and make sure they know the procedures and local contacts - If mines or UXO are found, suspend construction work and not resume until the safety of construction workers is confirmed. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
			<ul style="list-style-type: none"> - If mines or UXO are found, demining work is to be carried out. - Ensure instructions on first aid as stipulated in the SOPs in the event of an accident. 	CND	Consultant / ENDE/CND	Included in the cost of

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
			<ul style="list-style-type: none"> - Ensure safety measures for workers (e.g. wearing protective clothing and proper equipment maintenance). 			demining work
		<ul style="list-style-type: none"> - Accidents at construction sites. - hygiene problem 	<ul style="list-style-type: none"> - Manuals on occupational accident prevention (including safety education and training) should be prepared and thoroughly implemented. - Provide safety equipment - Ensure that cranes and other lifting equipment use is below the expected weight. - Maintenance checks and proper checking of lifting equipment - Use of equipment and devices to prevent electrical shock. - Establish medical posts in labour camps and conduct regular health check-ups. - Fire precautions are taken and fire extinguishers etc. are deployed at the site office and labor camps. - Keep medical supplies and lifesaving equipment always available and installed in labour camps and construction site offices. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
15	Accidents	<ul style="list-style-type: none"> - Accidents caused by explosions of mine and UXO 	<ul style="list-style-type: none"> - Inform the public about the procedures of demining work when they are found, and contact details, and post them near the construction site at all times. - If mine or UXO are found, suspend construction work and not resume the construction work until the safety of construction workers and the surrounding population is confirmed. 	Contractor	Consultant / ENDE	Included in the Contractor's contract
			<ul style="list-style-type: none"> - If mine or UXO are found, carry out demining work. - Take measures such as traffic restrictions to ensure safety in the vicinity. - Take measures to prevent accidents, such as prohibiting entry and traffic in the vicinity until the demining work is completed. 	CND	Consultant / ENDE/CND	Included in the cost of demining work

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
		- Traffic accidents due to increased traffic volume	- Provide education on compliance with traffic rules, traffic signage and safe driving. - Provide training on safe vehicle operation. - Carry out regular inspections and maintenance of equipment and instruments.	Contractor	Consultant / ENDE	Included in the Contractor's contract
Operation phase						
1	Water pollution	- Generation of domestic wastewater by facility personnel	- Proper disposes of wastewater, rubbish, fuel and oil etc - Provide training to operator of wastewater, rubbish, fuel and oil.	ENDE	ENDE	ENDE Measures can be taken through standard, careful management and operation, and special cost is not required.
2	Noise and vibration	- Noise and vibration from related vehicle traffic is expected to be generated, and background noise from substations	- Standardisation of speed limits and traffic routes for the vehicles concerned, and taking all possible measures to prevent noise from substation facilities, especially transformers.	ENDE	ENDE	ENDE Measures can be taken through standard, careful

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						management and operation, and special cost is not required.
3	Offensive odors	- Generation of odours due to improper waste management.	- Ensure proper disposal of waste generated by the activities of maintenance personnel as a manned facility.	ENDE	ENDE	ENDE Measures can be taken through standard, careful management and operation, and special cost is not required.
4	Waste	- Impact of improper waste management.	- Ensure proper disposal of waste generated by the activities of maintenance personnel as a manned facility.	ENDE	ENDE	ENDE Measures can be taken through standard,

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

No	Items (impacts)	Sources of Potential Impact	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost
						careful management and operation, and special cost is not required.
5	Topography and geology	- Erosion due to long-term rainfall	- Improvement of stormwater drainage systems around substations.	ENDE	ENDE	ENDE Measures can be taken through standard, careful management and operation, and special cost is not required.

Source: JICA survey team

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

Table 6-3 Environmental Monitoring Plan

(1) 60 kV Distribution Line

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
Pre-construction phase							
1	Air pollution	PM10, PM2.5	Boundaries of dwellings and other structures in close proximity to the two tower locations	Once every 3 months before and after felling and de-rooting	Consultant	ENDE	Included in the Consultancy Services
2	Water pollution	Wastewater treatment records	Construction sites, workers' camp	Once a week	CND	Consultant / ENDE / CND	Included in the cost of demining work
		Water quality items: pH, water temperature, conductivity, (transparency)	If there is running water in the stream near the location of the tower	Once every 3 months before and after felling and de-rooting	Consultant	ENDE	Included in the Consultancy Services
3	Soil pollution	Fuel, lubricant and other oil leakage records	Construction sites, workers' camp	Once a week	CND	Consultant / ENDE / CND	Included in the cost of demining work
4	Noise and vibration	- noise level - complaint	- Boundaries of dwellings and other structures in close proximity to the two tower locations. - Municipalities, communes and settlements	- Once every 3 months before and after felling and de-rooting - at any time	Consultant	ENDE	Included in the Consultancy Services
5	Offensive odors	- sensory - complaint	- workers' camp - Municipalities, communes and settlements	- Once a week - at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
6	Waste	Waste storage and transport	Workers' camp, construction sites	Once a week	CND	Consultant / ENDE / CND	Included in the cost of demining work
7	Ecosystems	flora and fauna	2 points of steel tower location within the clearing and rooting area	Once every 6 months before and after felling and de-rooting	Consultant	ENDE	Included in the Consultancy Services
		birds	Observations are made at two tower positions within the clearing and rooting area	Once every 6 months before and after felling and de-rooting	Consultant	ENDE	Included in the Consultancy Services
8	Land acquisition	- Private land / used land	Tower location, ROW	During geological investigation and	Consultant	ENDE	Included in the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
	and resettlement	area - residential building - place of work		detailed design			Consultancy Services
		- Alternative land / buildings - Compensation process (including local consultations)	Land acquisition points (construction sites, ROW, tower)	- When compensation is provided - Local consultation meeting	ENDE	ENDE	ENDE
9	Existing social infrastructures and services	Impact on social services of demining work	- Tower location - ROW - Surrounding settlements and facilities	at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
10	Working environment (including occupational safety)	Casualties among operators due to mine and UXO explosion	Tower location, ROW	at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
11	Accidents	Accidents occurred due to mine and UXO explosion	Tower location, ROW and workshop	at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
Construction phase							
1	Air pollution	PM10, PM2.5	Boundaries of dwellings and other structures in close proximity to the two tower locations	Once every three months before and after construction of a steel tower	Contractor	Consultant / ENDE	Included in the Contractor's contract
2	Water pollution	- Wastewater treatment records	- Substation construction site - workers' camp	at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract
		Water quality items: pH, temperature, conductivity, (transparency)	If there is running water in the stream near the location of the tower	Once every three months before and after construction of a steel tower	Contractor	Consultant / ENDE	Included in the Contractor's contract
3	Soil pollution	Fuel, lubricant and other oil leakage records	Construction sites, workers' camp	at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract
4	Noise and vibration	- noise level - complaint	- Boundaries of dwellings and other structures in close proximity to the two	- Once every three months before and after steel tower construction	Contractor	Consultant / ENDE	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
			tower locations. - Municipalities, communes and settlements	- at any time			
5	Offensive odors	- sensory - complaint	- workers' camp - Municipalities, communes and settlements	- Once a week - at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract
6	Waste	Waste storage and transport	Workers' camp, construction sites	Once a week	Contractor	Consultant / ENDE	Included in the Contractor's contract
7	Ecosystems	flora and fauna	Two steel tower construction locations	- Once every six months before and after construction of a steel tower	Contractor	Consultant / ENDE	Included in the Contractor's contract
		birds	Two steel tower construction locations	- Once every six months before and after construction of a steel tower	Contractor	Consultant / ENDE	Included in the Contractor's contract
8	Land acquisition and resettlement	- Livelihood level and means of the affected population - Resident relations (e.g. complaint handling)	Place of residence / place of livelihood of affected population	Once every three months (at any time for residents relations)	ENDE	ENDE	ENDE
		Site management (e.g. access restrictions and boundary management)	- Tower location ROW	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
9	Land use and utilization of local resource	Resident relations (e.g. complaint handling)	Place of residence/place of livelihood of affected population	at any time	ENDE	ENDE	ENDE
		Site management (e.g. access restrictions and boundary management)	Tower location, ROW	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
10	Existing social infrastructure	- Construction plans (e.g. time, number and	- vehicle operation record - Accident	- at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
	res and services	frequency of vehicle operations) - vehicle operation record - Number of road accidents	records (construction site offices)				
11	Misdistribution of benefits and damages	- Level and means of livelihood of affected population - Resident relations (e.g. complaint handling)	- concerned villages	Once every three months (at any time for residents relations)	ENDE	ENDE	ENDE
12	Local conflicts of interest	- Livelihood level and means of the affected population - Resident relations (e.g. complaint handling)	- concerned villages	Once every three months (at any time for residents relations)	ENDE	ENDE	ENDE
13	Landscape	- trees and shrubs - Harmony between populated and natural landscapes	- ROW / tower location - Location of labor camps and material storage sites	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
14	Gender	Resident relations (e.g. complaint handling)	concerned villages	at any time	ENDE	ENDE	ENDE
		Number of times, content and number of participants in instruction to contractor and subcontractor employees	Guidance records (construction site offices)	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
15	Children's rights	Resident relations (e.g. complaint handling)	concerned villages	at any time	ENDE	ENDE	ENDE
		Availability of employment in construction	Employment records (construction site offices)	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
16	Infectious diseases	- Number of diseases and	- Sanitation records	Once every three months	Contractor	Consultant / ENDE	Included in the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
	such as HIV/AIDS	<ul style="list-style-type: none"> - infections - having ready medical supplies - Number and type of vaccinations - Number of times, content and number of participants in instruction to contractor and subcontractor employees 	<ul style="list-style-type: none"> - inventory ledger - Immunization records - Guidance records (construction site offices) 				Contractor's contract
17	Working environment (including occupational safety)	Casualties among workers due to mine and UXO explosion	construction site	at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract
		Demining work	construction site	at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
		<ul style="list-style-type: none"> - Number of times, content and number of participants in safety training for tractor and subcontractor employees. - Standing availability of PPE - Work contents - Health status of workers. - number of accidents - working hours 	<ul style="list-style-type: none"> - Guidance records (construction site offices). - inventory ledger - operation record - health record - accident record - working hours record 	Once every three months	Contractor	Consultant / ENDE	Included in the Contractor's contract
18	Accidents	Casualties among workers due to mine and UXO explosion	construction site	at any time	Contractor	Consultant / ENDE	Included in the Contractor's contract
		Demining work	construction site	at any time	CND	Consultant / ENDE / CND	Included in the cost of demining work
		- work contents	- vehicle operation	at any time	Contractor	Consultant / ENDE	Included in the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
		- vehicle operation record - number of accidents	record - Accident records (construction site offices)				Contractor's contract
Operation phase							
1	Noise and vibration	- noise level - complaint	- Two representative points under the railway line and on the administrative road, areas where wind noise is likely to occur and neighboring settlements - Municipalities, communes and settlements	- Once every three months - at any time	ENDE	ENDE	ENDE
2	Ecosystems	flora and fauna	2 representative steel tower positions	Once every three months	ENDE	ENDE	ENDE
		birds	2 representative steel tower positions	Once every three months	ENDE	ENDE	ENDE

Source: JICA survey team

Table 6-3 Environmental Monitoring Plan

(2) 60/15 kV Arimba Substation

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
Pre-construction ('before' and 'during' covering mine and UXO search and clearance activities before and during implementation).							
1	Air pollution	- SO ₂ , NO ₂ , O ₃ - PM10, PM2.5	- East Lubango SS - Boundaries of dwellings and other structures in close proximity to substations, access roads	- Once every 6 months before and after felling and de-rooting, for one week in a row - Once every 3 months before and after felling and de-rooting	Consultant	RNT	Included in the cost of Consultancy Services
2	Water pollution	Wastewater treatment records	East Lubango SS, workers' camp	Once a week	CND	Consultant / RNT / CND	Included in the cost of demining work

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
3	Soil pollution	Fuel, lubricant and other oil leakage records	East Lubango SS, workers' camp	Once a week	CND	Consultant / RNT / CND	Included in the cost of demining work
4	Noise and vibration	- Noise level - complaint	- East Lubango SS and adjacent residential and other boundaries, access roads - Municipalities, communes and settlements	- Once every 3 months before and after felling and de-rooting - at any time	Consultant	RNT	Included in the Consultancy Services
5	Offensive odors	- sensory - complaint	- East Lubango SS, workers' camp. - Municipalities, communes and settlements	- Once a week - at any time	CND	Consultant / RNT / CND	Included in the cost of demining work
6	Waste	Waste storage and transport	East Lubango SS, workers' camp	Once a week	CND	RNT	Included in the cost of demining work
7	Ecosystems	flora and fauna	East Lubango SS	Once every 6 months before and after felling and de-rooting	Consultant	RNT	Included in the Consultancy Services
		birds	East Lubango SS	Once every 6 months before and after felling and de-rooting	Consultant	RNT	Included in the Consultancy Services
8	Topography and geology	Topographic and vegetation changes and soil erosion	East Lubango SS	Once each before and after felling and de-rooting.	Consultant	RNT	Included in the Consultancy Services
9	Working environment (including occupational safety)	Casualties among operators due to mine and UXO explosion	East Lubango SS	at any time	CND	Consultant / RNT / CND	Included in the cost of demining work
10	Accidents	Accidents occurred due to mine and UXO explosion	East Lubango SS and workshop	at any time	CND	Consultant / RNT / CND	Included in the cost of demining work
Construction phase							
1	Air pollution	- SO ₂ , NO ₂ , O ₃ - PM10, PM2.5	- East Lubango SS - Boundaries of dwellings and other structures in close proximity to substations, access roads	- Once every six months for one week in a row - Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
2	Water pollution	Wastewater treatment records	East Lubango SS, workers' camp	at any time	Contractor	Consultant / RNT	Included in the

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
							Contractor's contract
3	Soil pollution	Fuel, lubricant and other oil leakage records	East Lubango SS, workers' camp	at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
4	Noise and vibration	- noise level - complaint	- East Lubango SS, and adjacent residential and other boundaries, access roads - Municipalities, communes and settlements	- Once every three months - -At any time	Contractor	Consultant / RNT	Included in the Contractor's contract
5	Offensive odors	- sensory - complaint	- East Lubango SS, workers' camp. - Municipalities, communes and settlements	- Once a week - at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
6	Waste	Waste storage and transport	East Lubango SS, workers' camp	Once a week	Contractor	Consultant / RNT	Included in the Contractor's contract
7	Ecosystems	flora and fauna	East Lubango SS	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
		birds	East Lubango SS	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
8	Topography and geology	- Topographic and vegetation changes and soil erosion	- East Lubango SS	Once every six months	Contractor	Consultant / RNT	Included in the Contractor's contract
9	Existing social infrastructures and services	- Construction plans (e.g. time, number and frequency of vehicle operations) - vehicle operation record - Number of road accidents	- vehicle operation record - Accident records (construction site offices)	at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
10	Landscape	- trees and shrubs - Harmony between populated	- East Lubango SS - Location of labor camps and material	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
		and natural landscapes	storage sites				
11	Gender	Resident relations (e.g. complaint handling)	concerned villages	at any time	RNT	RNT	RNT
		Number of times, content and number of participants in instruction to contractor and subcontractor employees	Guidance records (construction site offices)	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
12	Children's rights	Resident relations (e.g. complaint handling)	concerned villages	at any time	RNT	RNT	RNT
		Availability of employment in construction	Employment records (construction site offices)	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
13	Infectious diseases such as HIV/AIDS	<ul style="list-style-type: none"> - Number of diseases and infections - having ready medical supplies - Number and type of vaccinations - Number of times, content and number of participants in instruction to contractor and subcontractor employees 	<ul style="list-style-type: none"> - Sanitation records - inventory ledger - Immunization records - Guidance records (construction site offices) 	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract
14	Working environment (including occupational safety)	Casualties among workers due to mine and UXO explosion	construction site	at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
		Demining work	construction site	at any time	CND	Consultant / RNT / CND	Included in the cost of demining work
		<ul style="list-style-type: none"> - Number of times, content and number of participants in safety training for tractor and subcontractor 	<ul style="list-style-type: none"> - Guidance records (construction site offices). - inventory ledger - operation record - health record 	Once every three months	Contractor	Consultant / RNT	Included in the Contractor's contract

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huila Province

No	Items (impacts)	Monitoring Parameter	Monitoring Point	Frequency	Implementing Organization	Responsible Organization	Cost
		employees. - Standing availability of PPE - Tasks - Health status of workers. - number of accidents - working hours	- accident record - working hours record				
15	Accidents	Casualties among workers due to mine and UXO explosion	construction site	at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
		Demining work	construction site	at any time	CND	Consultant / RNT / CND	Included in the cost of demining work
		- work contents - vehicle operation record - number of accidents	- vehicle operation record - Accident records (construction site offices)	at any time	Contractor	Consultant / RNT	Included in the Contractor's contract
Operation phase							
1	Water pollution	Status of disposal of wastewater, garbage, fuel, oil, etc. and education implementation	East Lubango SS	Once every three months	RNT	RNT	RNT
2	Noise and vibration	- noise level - complaint	- East Lubango SS and adjacent residential and other boundaries, access roads - Municipalities, communes and settlements	- Once every three months - at any time	RNT	RNT	RNT
3	Offensive odors	- sensory - complaint	- East Lubango SS	- at any time	RNT	RNT	RNT
4	Waste	Waste storage and transport	East Lubango SS	at any time	RNT	RNT	RNT
5	Ecosystems	flora and fauna	East Lubango SS	Once every three months	RNT	RNT	RNT
		birds	East Lubango SS	Once every three months	RNT	RNT	RNT
6	Topography and geology	Topographic and vegetation changes and soil erosion	East Lubango SS	Once every six months	RNT	RNT	RNT

Source: JICA survey team

6.2. Waste Management Plan

The Waste Management Plan (WMP) main goal is to plan the management operations of waste generated during the construction and operational phases of the Project. The WMP will stimulate a sustainable environment, in order to minimize the production of waste, and other wastes from the source, adjust their segregation at the origin, their correct identification and storage; and control the potential environmental and public health risks. The management of solid waste must comply with the legislation in force.

The WMP was previously prepared by the Project promoter and will be submitted to the National Waste Agency (ANR) for technical advice and approval (see Appendix 2).

6.3. Occupational Health, Safety and Environment Program

The Occupational Health, Safety and Environment Program (OHSE) aims to establish measures to adequately manage the risks, and the occurrence of work accidents during the installation of equipment, as well as optimize the environmental conditions at the workplace.

The Occupational Health, Safety and Environment Program should take into account two phases. The first is the construction phase, which is a dynamic phase, and the risks on the employees vary between the first and the last day of work. During this phase the EPC must provide all information on OHSE to its workers, and make available Personal Protective Equipment (PPE) and Collective Protective Equipment (CPE), reducing the risk of accidents. Weekly meetings should also be held to enforce OHSE compliance, draft and implement action plans following meetings. The contractor must also comply with the legislation on OHSE in force in the country. During the construction phase, EPC will establish a Reporting System that periodically will record incidents, near misses and accidents through monthly reports.

The second phase encompasses the operation of the distribution line equipment. Although being a more monotonous phase - the risks are not as dynamic as in the first phase - these should be foreseen by the entity responsible for it. Employees should also be informed and qualified to deal with these risks. In this phase the risks will be associated with the maintenance of energized equipment.

In both phases, OHSE signs and/or signals should be positioned at the sites defined as priority, alerting the employees to the risks, and minimizing potential problems.

6.4. Construction Management Plan

The Construction Management Plan (CMP) will focus exclusively on the construction phase of the Project and will outline the mitigation measures required to ensure that potential negative environmental, health and safety and social impacts are avoided or, if not possible, reduced in terms of magnitude and significance. Concomitantly, the CMP will also specify concrete actions, responsibilities, compliance requirements and mitigation activities to be followed during the pre-

construction and construction phases. The mitigations and measures that will be detailed in this plan are necessary to achieve compliance with the requirements of the Project's commitments, good practice and international standards. The EPC will be responsible for the preparation and implementation of the Plan and the ENDE will be responsible for approving it.

6.5. Emergency Preparedness and Response Plan

The EPRP is essentially aimed at establishing a readiness and response mechanism against accidents in the Project's operations taking place in the worker's camp, as well as during line maintenance operations, such as fire in conductors, transformers, backup generators or fall of steel cables and very high voltage towers due to natural phenomena (wind, rain, etc.), risks of electrocution and/or collision of motor vehicles with the towers, and overflow or spillage of hydrocarbons, etc. This Plan aims to ensure a rapid and effective response to such incidents and/or accidents. This Plan aims to ensure a rapid and effective response to such incidents and/or accidents. The plan will be prepared to guide preventive actions and will provide a timely response to any accident or pollution event occurring along the Project's route. The procedures set out in the EPRP will apply to the facilities supporting the works (construction sites), the different work fronts, etc. EPC's Health, Safety and Environment Department will be responsible for the compliance with the plan and all workers involved in the Project, including visitors, should receive the necessary information for an adequate response in case of emergency.

6.6. Traffic Management Plan

A Traffic Management Plan should be developed to include proper implementation of measures identified for the management of the traffic and to ensure the safety of all road users as well as the workers at site. This plan should provide also assure the smooth operation of the road network as well as the work site. This document should include the description of the proposed works and roads to be used; the identification and assessment of traffic impacts of proposed works; detailed traffic management measures to ameliorate the impacts of proposed works; assessment of public transport services affected; detailed provisions made for emergency vehicles, heavy vehicles, cyclists and pedestrians (particularly children); assessment of effect of proposed traffic management measures on traffic movements in adjoining streets; and proposed public/ tenant notification process if required.

Chapter 7

FINAL CONSIDERATIONS

7. FINAL CONSIDERATIONS

The Long-Term Strategy Angola 2025 defines as vision for the energy sector: "to ensure an efficient and integrated contribution of all energy sources that constitute the energy matrix of Angola, for the sustainable development of the country and its energy self-sufficiency, promoting a growing intervention of energies supported on renewable natural resources". The construction project for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province contributes to this vision.

The National Company for Electricity Distribution – E.P. (ENDE) in partnership with Japan International Cooperation Agency (JICA) and their contractor, Tokyo Electric Power Services Co., Ltd. (TEPSCO) intend to build a 60 kV electricity distribution line with approximately 9 km, in Lubango (Huíla province) between the East Lubango Substation and the Arimba Substation. This Project has a strategic economic and social potential for the development the Huíla province improving the electricity supply for various consumers, urban lighting and promoting tourism and industrialisation

It was found with this SES that the project actions will exert different pressures on the environment, which result in different classifications of impacts (changes in the environment). Therefore, the potential positive and negative impacts anticipated due to the construction and operation of the project are reflected in minor up to significant changes; but no major negative changes that could cause significant negative impacts on environment and social component. However, all negative impacts must be mitigated and/or avoided, provided by all mitigation measures proposed in this document for each component and implemented effectively, as well as the enforcement of good environmental management practices during the construction process. The positive impacts must be maximized whenever possible.

Regarding the Physical Component, and according to the specifications of the project, no changes in the status quo are anticipated in both phases of the project (climatic parameters and water resources). On the other hand, minor to medium negative impacts are anticipated, associated with ground modelling and compaction, soil contamination, the dispersion of particulate matter and the emission of gases that result from the circulation of (mainly heavy) vehicles, as well as noise generation and, vibrations. Little changes are expected to the landscape since the structures to be installed will be close to roads and/or close to existing structures of the same characteristics.

For the Ecological and Biological Component, based on the pressures of the project, minor to moderate negative impacts are expected on habitats, vegetation and fauna. These negative impacts are mainly associated with vegetation removal. The vegetation removal to clear a ROW for the distribution line it's expectable to cause loss of biodiversity, habitat fragmentation, changes in light conditions and invasion of exotic species. The destruction of feeding and shelter areas and electrocution of wild animals (mainly birds and climber animals) are the main expected impacts. The vegetation removal and yard activities during construction phase will modify the relationship between flora and fauna, food chain balance and ecosystem services in the areas affected by the project. However, applying all mitigation measures described before, these impacts can be minimized greatly.

Negative and positive impacts are anticipated for the Social and Cultural Component. It's expected minor to medium negative impacts, and they are associated with potential discomforts/dissatisfaction of the local community, due to the potential power outages, degradation in air quality and the increase in noise from construction activities. Impacts on the health of employees are also anticipated, namely the risk of work accidents (maintenance of energized equipment) in construction and operation phases. The positive impacts are associated with manpower requirements, and mainly with the improvement of power supply of the public power network in all regions/communities affected by the project. No impacts are anticipated on the historical or cultural aspects.

Although currently no land acquisition, physical displacement or economic displacement is anticipated this information should be confirmed during the topographic surveys which will be undertaken prior to construction to define the exact locations for the towers and avoid and/or minimize any potential physical resettlement or economic displacement. In case this is not possible, a Resettlement Action Plan and/or a Livelihood Restoration Plan will be developed by ENDE.

Both negative and positive impacts are expected for the Economic and Legal Component. Minor to significant positive impacts are anticipated and are associated with the search for goods and services, income improvement, increase in the transformation/conversion and distribution capacity of the public power network. The medium negative impact is related to the overload of road infrastructures, however it will be only in construction phase, a relatively small period of time. Positive impacts are equally foreseen, and associated with the compliance of the national legislation, and social development policies and strategies of the Angolan Government.

In view of the social and environmental impacts identified in the Environmental and Social Impact Assessment, and based on the feasibility of the mitigation measures, no environmental impediment to the execution of the Project.

In addition, it is important to note that the Project implementation must scrupulously consider the Environmental and Social Management Plan (ESMP) and its respective programmes and plans for environmental management and occupational health and safety proposed in **Chapter 6**, as well as national legislation in force, the JICA Guidelines for Environmental and Social Considerations (April 2010), other international best practices and additional measures that may eventually be recommended by the environmental agency

Chapter 8

BIBLIOGRAPHY

8. BIBLIOGRAPHY

- ALEXANDER, G. and Marais, J., 2007. **A guide to the reptiles of southern Africa**. Struik Pub
- AZEVEDO, A.L., REFEGA, A.A.G., SOUSA, E.C., PORTAS, C.A.N., VILHENA, M.A.L., MARQUES, M.N., LOURO de SÁ, V.H. (1972). **Summary Characterization of the Environmental Conditions of Angola**. University of Luanda. Nova Lisboa. 106p.
- BAPTISTA, N., Conradie, W., Vaz Pinto, P., & Branch, W. R. 2019. **The amphibians of Angola: early studies and the current state of knowledge**. In Biodiversity of Angola (pp. 243-281). Springer, Cham.
- BARBOSA, L. A. G. (2009). **Phytogeography Chart of Angola, Institute of Scientific Research of Angola**. Fac-simulated edition, Luanda
- BEJA, P., Vaz Pinto, P., Veríssimo, L., Bersacola, E., Fabiano, E., Palmeirim, J. M., & Taylor, P. J. 2019. **The mammals of Angola**. In Biodiversity of Angola (pp. 357-443). Springer, Cham.
- BERSACOLA, E., Svensson, M. S., Bearder, S. K., Mills, M., & Nijman, V. 2014. **Hunted in Angola- Surveying the bushmeat trade**. Swara, 2014, 31-36.
- BRAUN-BLANQUET, J. (1979). **Phytosociology. Bases para el estudio de las comunidades vegetales**. H. Blumes Ediciones, Madrid, Spain.
- BRANCH, B. (1998). **Field Guide to Snakes and Other Reptiles of Southern Africa**. Third edition. Struik Publishers (Pty) Ltd. Cape Town. 399p.
- BRANCH, W. R., Vaz Pinto, P., Baptista, N., & Conradie, W. 2019. **The reptiles of Angola: history, diversity, endemism and hotspots**. In Biodiversity of Angola (pp. 283-334). Springer, Cham.
- BOCAGE, J.V.B., 1895. **Herpétologie d'Angola et du Congo**. Impr. Nationale.
- BOULENGER, G.A., 1905. X.—**A List of the Batrachians and Reptiles collected by Dr. WJ Ansorge in Angola, with Descriptions of new Species**. Journal of Natural History, 16(92), pp.105-115.
- BURGESS, N., Hales, J. A., Underwood, E., Dinerstein, E., Olson, D., Itoua, I., & Newman, K. 2004. **Terrestrial ecoregions of Africa and Madagascar: a conservation assessment**. Island Press.
- BUTLER, B. O., Ceríaco, L. M., Marques, M. P., Bandeira, S., Júlio, T., Heinicke, M. P., & Bauer, A. M. 2019. **Herpetological survey of Huíla Province, southwest Angola, including first records from Bicuar National Park**. Herpetological Review, 50(2), 225-240.
- CARRUTHERS, V., 2001. **Frogs and frogging in southern Africa**. Struik

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

CERÍACO, L. M., de Sá, S. D. A. C., Bandeira, S., Valério, H., Stanley, E. L., Kuhn, A. L., & Bauer, A. M. 2016. **Herpetological survey of Iona National Park and Namibe Regional Natural Park, with a synoptic list of the amphibians and reptiles of Namibe Province, southwestern Angola.** Proceedings of the California Academy of Sciences, 63(2), 15-61.

CHANNING, A., 2001. **Amphibians of central and southern Africa.** Comstock Pub. Associates.

CHANNING, A. & Rödel, M-O. 2019, Field Guide to the Frogs & other Amphibians of Africa: **Field Guide to the Frogs & other Amphibians of Africa.** Struik Nature, Penguin Random House, Cape Town, South Africa, ISBN: 9781775845126.

CEZARD, C., BINIOLO, MAGUENOER, J.M. **Toxicologie du plomb chez l'homme,** Paris: Lavoisier Tec. & Doc, 1992. Pag.331.

CONRADIE, W., Branch, W. R., & Tolley, K. A. 2013. **Fifty shades of grey: giving colour to the poorly known Angolan Ashy reed frog (Hyperoliidae: Hyperolius cinereus), with the description of a new species.** Zootaxa, 3635(3), 201-223.

COSTA, E. DOMBO, A. & PAULA, M. (2009). **Endangered Plants in Angola.** Botany Center, Faculty of Sciences of UAN, Luanda.

CRAWFORD-CABRAL, J., & Veríssimo, L. N. 2005. **The ungulate fauna of Angola:** systematic list, distribution maps, database report. Ministério da Ciência, Tecnologia e Ensino Superior, Instituto de Investigação Científica Tropical.

DEAN, W.R.J., 2000. **The birds of Angola:** an annotated checklist. British Ornithologists' Union.

DEAN, W. R. J., Melo., M., & Mills, M. S. 2019. **The avifauna of Angola:** richness, endemism and rarity. In Biodiversity of Angola (pp. 335-356). Springer, Cham.

DINIZ, A. C. (1973). **Mesological characteristics of Angola.** Angola Agricultural Surveys Mission/Agronomic Research Institute of Angola, Nova Lisboa.

DINIZ, A. C. & AGUIAR, F. Q. B. (1998). **Agro-Ecological Zone of Angola.** Portuguese Cooperation Institute, Lisbon.

DU PREEZ, L.H., Carruthers, V. and Burger, M., 2009. **A complete guide to the frogs of southern Africa.** Struik nature

ERM and Holísticos (2018). **Laúca-Bita Transmission Line, Angola: Environmental and Social Impact Assessment Report.** Luanda. Angola.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

ESTES, R., 1991. **The behavior guide to African mammals** (Vol. 64). Berkeley: University of California Press.

FISHPOOL, L.D. and Evants, M.I., 2001. **Important bird areas in Africa and associated islands Priority sites for conservation**. Birdlife international.

Greenland, S., Sheppard, A.R., Kaune, W.T., Poole, C. & Kelsh, M.A. (2000) **A pooled analysis of magnetic fields, wire codes and childhood leukaemia**. Epidemiol. 11: 624-634.

GOSSWEILER, J. & MENDONÇA, F.A. (1939). **Phytogeographic chart from Angola**. Luanda: Government-General of Angola.

GOVERNMENT OF ANGOLA. (1960). **Regulation on Substation Safety** (Decree No. 42895, dated March 31st). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (1966). **Regulation of the Protection of High Voltage Transmission** (Decree No. 46.847, dated 1966). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (1994a). **Decree on Safety, Health and Hygiene at Work** (Decree No. 31/94 of 5th August). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (1994b). **Executive Decree on the General Regulation of Safety and Health Signalling at Work** (Executive Decree No. 128/04 of November 23rd). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (1996). **Executive Decree on the General Regulation of Occupational Safety and Hygiene Services in Companies** (Executive Decree No. 6/96 of February 2nd). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (1998). **Environmental Framework Law** (Law No. 5/98 of 19th June). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2001). **Regulation of Electric Power Production** (Decree No. 47/01 of 20th July). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2004a). **Regulation of Licensing of Installations of Production, Transport and Distribution of Energy** (Decree No. 41/04 of 2nd July). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2004b). **The Land Law** (Law No. 9/04 of 9th November). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2005a). **Decree on the Legal Regime for Accidents at Work and Occupational Diseases** (Decree No. 53/05 of August 15th). Government of Angola. Luanda.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

GOVERNMENT OF ANGOLA. (2005b). **Cultural Heritage Law** (Law No. 14/05 of 7th October). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2006). **Law on Aquatic Biological Resources** (Law No. 6-A/04 of 8th October). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2009a). **Joint Executive Decree approving Environmental Licensing Fees** (Executive Decree No. 96/09 of October 6th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2009b). **Replaces Table Attached to the Joint Executive Decree approving Environmental Licensing Fees** (Executive Decree No. 130/09 of November 26th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2010). **Constitution of the Republic of Angola** (Diário da República No. 23 of 5th February). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2011a). **Administrative Offences Law** (Law No. 12/11 of February 16th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2011b). **Presidential Decree approving the Regulation on Responsibility for Environmental Damage** (Presidential Decree No. 194/11 of July 7th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2011c). **National Energy Security Policy and Strategy** (Presidential Decree No. 256/11 of 29th September). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2011d). **Regulation of Water Quality** (Presidential Decree No. 261/11 of 6th October). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2012). **Regulation of Waste Management** (Presidential Decree No. 190/12 of August 24th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2014a). **Regulation of Public Water Supply and Wastewater Sanitation** (Presidential Decree No. 83/14 of April 22nd). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2014b). **General Use Regulation of Water Resources** (Presidential Decree No. 82/14 of 21st April). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2015). **Presidential Decree approving the Organic Statute of the Institute of Civil Aviation** (Presidential Decree No. 2/15 of January 2st). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2017). **National Development Plan 2018 - 2022**. Government of Angola. Luanda.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

GOVERNMENT OF ANGOLA. (2018a). **Presidential Decree approving the Organic Statute of the Ministry of Energy and Water** (Presidential Decree No. 24/18 of January 31st). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2018b). **Presidential Decree approving the Organic Statute of the Ministry of Transport** (Presidential Decree No. 25/18 of January 31st). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2018c). **Regulation for the Transfer of Waste for Reuse, Recycling and Its Recovery** (Presidential Decree No. 265/18 of November 15th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2020a). **National Biodiversity Strategy and Action Plan** (Presidential Decree No. 26/20 of February 6th). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2020b). **Presidential Decree on the Environmental Impact Assessment Regulation and Environmental Licensing Procedure** (Presidential Decree No. 117/20 of April 22nd). Government of Angola. Luanda.

GOVERNMENT OF ANGOLA. (2020c). **Presidential Decree approving the Organic Statute of the Ministry of Culture, Tourism and Environment** (Presidential Decree No. 162/20 of June 8th). Government of Angola. Luanda.

Holísticos (2019). **Environmental and Social Impact Assessment of the Cuanza-Norte Energy Distribution Network – Rural and Local Electrification**. Luanda. Angola

Holísticos (2019). **Huambo – Lubango Transmission Line, Angola: Environmental and Social Impact Assessment Report**. Luanda. Angola.

Holísticos (2022). **Environmental and Social Impact Assessment Report for the 220 kV Transmission Line Project between Lubango and Moçâmedes, Huíla and Namibe Provinces**. Luanda. Angola.

HUNTLEY, J. B., RUSSO, V., LAGES, F., DE ALMEIDA, F. N. (2019). **Biodiversity of Angola**. 1st Edition. Art and Science.

HILL, J. E., & Carter, T. D. 1941. **The mammals of Angola**, Africa. Bulletin of the AMNH; v. 78, article 1. Kingdon, J., Happold, D., Butynski, T., Hoffmann, M., Happold, M. and Kalina, J. (Eds) 2013. **Mammals of Africa**. A&C Black.

International Finance Corporation (IFC) (2012). **Performance Standards on Environmental and Social Sustainability**.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

International Finance Corporation (IFC). (2007) IFC EHS Guidelines for Electric Power Transmission and Distribution. Available at: <https://www.ifc.org/wps/wcm/connect/66b56e00488657eeb36af36a6515bb18/Final++Electric+Transmission+and+Distribution.pdf?MOD=AJPERES>. Accessed: October 2020.

IUCN. (1994) Annual report 1994: IUCN - **The World Conservation Union**. Available at <https://portals.iucn.org/library/node/7133>. Accessed: July 2021.

John & Stephe Mendelsohn (2018). **South West Angola – a portrait of land and life**. Publi. RAISON. Windhoek. Namibia.

Kingdom of Central West Africa (c. 1575 – 1641). **MA Thesis Archaeology; University of South Africa**. Supervisor: Prof JCA Boeyens.

LAURENT, R.F., (1964). Reptiles et amphibiens de l'Angola: troisieme contribution. Publ. Cuit. Mus. Dundo, 67.

LIST, I.R., (2011). **IUCN red list**.

JENKINS, A. R., Smallie, J. J., & Diamond, M. (2010). **Avian collisions with power lines: a global review of causes and mitigation with a South African perspective**. Bird conservation international, 20(3), 263-278.

JICA (2010). **Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations**. Tokyo. Japan.

MACEWAN, K. 2019. Bats - **Strategic Environmental Assessment for the Expansion of Electricity Grid Infrastructure in South Africa**. SAHRA.

MARQUES, M.P., CERÍACO, L.M.P., BLACKBURN, D.C. AND BAUER, A.M., 2018. **Diversity and distribution of the amphibians and terrestrial reptiles of Angola. Atlas of historical and bibliographic records (1840-2017)**. Proceedings of the California Academy of Sciences. Series 4, Vol. 65, Sup. II, pp. 1-501.

MILLS, M.S. and Dean, W.R.J., 2007. **Notes on Angolan birds: new country records, range extensions and taxonomic questions**. Ostrich-Journal of African Ornithology, 78(1), pp.55-63.

MILLS, M.S., 2010. **Angola's central scarp forests: patterns of bird diversity and conservation threats**. Biodiversity and conservation, 19(7), pp.1883-1903.

MILLS, M. S. L., Franke, U., Joseph, G., Miato, F., Milton, S., Monadjem, A., & Dean, W. R. J. (2010). **Cataloguing the Lubango bird skin collection: towards an atlas of Angolan bird distributions**. Bull. ABC, 17, 43-53.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

MILLS, M. & VAZ PINTO, P. (2015). **A population of White-collared Olive back in Angola.** Bull ABC Volume 22 No 1, pag.64-67.

MINISTRY OF URBANISM AND ENVIRONMENT (2006). **Report of the General State of the Environment.** Luanda. Angola.

NATIONAL INSTITUTE OF STATISTICS - INE (2016). **Final Results of the General Census of Population and Housing of Angola.** Luanda. Angola.

NATIONAL INSTITUTE OF STATISTICS - INE (2018a). **Definitive Results of the General Census of Population and Housing in the Province of Huíla.** Luanda. Angola.

NATIONAL INSTITUTE OF STATISTICS - INE (2018b). **Definitive Results of the General Census of Population and Housing in the Province of Namibe.** Luanda. Angola.

OLIVEIRA, J.F. (2005). **Environmental Management.** Mr. Lidel. Lisbon.

PHILIPPI JR., A. (Ed.) (2006). **Environmental Management Course.** Editora Manole Ltda. São Paulo.

PINTO, A. (2005). **Environmental Management Systems.** Guide to its implementation. Syllable Edits. Lisbon.

QUINTERO, J. D. (2016). **Guide to Good Practices for Ecologically Correct Roads.** Latin America Conservation Council.

RODRIGUES, P., Figueira, R., Vaz Pinto, P., Araújo, M. B., & Beja, P. (2015). **A biogeographical regionalization of Angolan mammals.** Mammal review, 45(2), 103-116.

ROSA PINTO, A. A. 1983. **Ornitologia de Angola: Non passeres (Volume 1).** Instituto de Investigação Científica Tropical. Lisboa, Portugal.

RYAN, P.G., Sinclair, I., Cohen, C., Mills, M.S., Spottiswood, C.N. and Cassidy, R., 2004. **The conservation status and vocalizations of threatened birds from the scarp forests of the Western Angola Endemic Bird Area.** Bird Conservation International, 14(04), pp.247-260.

SCHIØTZ, A., 1999. **Treefrogs of Africa.** Ed. Chimaira.

SANCHEZ, L.E. (2008). **Environmental Impact Assessment - Concepts and Methods.** Text Workshops. Sao Paulo. 495p.

SINCLAIR, I. & RYAN, P. (2003). **A Comprehensive Illustrated Field Guide of Birds of Africa South of the Sahara.** Mr. StruikPublishers. Cape Town. 759p.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

THAXTER, C. B., Buchanan, G. M., Carr, J., Butchart, S. H., Newbold, T., Green, R. E., & Pearce-Higgins, J. W. 2017. **Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment.** Proceedings of the Royal Society B: Biological Sciences, 284(1862), 20170829

United Nations (UN). (1989) **Basel Convention on Hazardous Waste.** United Nations, Treaty Series, 1673, 57.

United Nations (UN). (1985) **Vienna Convention for the Protection of the Ozone Layer.** United Nations Treaty Series. 1513, 293.

United Nations Convention on Biological Diversity (UNCBD) (1992).

United Nations Development Programme (UNDP). (2016) **Human Development Report, 2016.**

United Nations Environment Programme (UNEP). (1989) **Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.**

United Nations Educational, Scientific and Cultural Organization (UNESCO). (1972) **Convention concerning the Protection of the World Cultural and Natural Heritage.** Basic Texts of the 1972 World Heritage Convention.

USAID (2018). **Social field survey. Strengthening land tenure and property rights in Angola: Land Law and Policy.** May 31, 2007.

World Health Organization (WHO). (2016) Angola: WHO statistical profile. Available at: <http://www.who.int/gho/countries/ago.pdf?ua=1>. Accessed: October 2020.

APPENDIX 1
HOLÍSTICOS CERTIFICATE

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



República de Angola

MINISTÉRIO DA CULTURA, TURISMO E AMBIENTE

GABINETE JURIDICO

CERTIFICADO DE CONSULTORIA AMBIENTAL

N.º 12159922221

O Gabinete Jurídico do Ministério da Cultura, Turismo e Ambiente, atesta que foram cumpridas todas as formalidades legais conducentes ao Registo Técnico da Sociedade de Consultoria Ambiental HOLISTICOS SERVICOS, EST.& CONSULTORIA, LIMITADA, nos termos do Decreto Executivo nº 86/12, de 23 de Fevereiro de 2012, que aprova o Regulamento sobre o Registo Técnico de Sociedade de Consultoria Ambiental.

Emitida em, 25 de Março de 2022	Válida até, 25 de Março de 2023
---	---

Assinatura

DANIEL JOÃO JORGE
Gabinete Jurídico

(DIRECTOR DO GABINETE JURÍDICO)



A autenticidade deste documento poderá ser verificada através dos passos a seguir:
1. Aceda ao Portal MINAMB (<https://sia.minamb.gov.ao/validacaodocumentos>)
2. Introduza o código RCONST-MT12OTY2Mzk= no campo "Código de Validação"
3. Clique em "Pesquisar"
Número do Certificado: 12159922221



APPENDIX 2

WASTE MANAGEMENT PLAN

APPENDIX 3

LIST OF BIRDS FOR PROJECT

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Pternistis afer</i>	Red-necked Spurfowl	LC	WS	R	M	P
<i>Caprimulgus fossii</i>	Square-tailed Nightjar	LC	WS	M	L	P
<i>Tachymarptis melba</i>	Alpine Swift	LC	WS	M	L	P
<i>Apus apus</i>	Common Swift	LC	WS	R	L	P
<i>Apus bradfieldi</i>	Bradfield's Swift	LC	WS	R	L	P
<i>Apus affinis</i>	Little Swift	LC	WS	R	L	R
<i>Centropus superciliosus</i>	White-browed Coucal	LC	WS	R	L	P
<i>Clamator jacobinus</i>	Jacobin Cuckoo	LC	WS	M	L	P
<i>Chrysococcyx caprius</i>	Diederick Cuckoo	LC	WS	M	L	P
<i>Columba livia</i>	Rock Dove	LC	WS	R	M	R
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC	WS	R	M	R
<i>Streptopelia capicola</i>	Ring-necked Dove	LC	WS	R	L	P
<i>Spilopelia senegalensis</i>	Laughing Dove	LC	WS	R	L	P
<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	LC	WS	R	L	P
<i>Bubulcus ibis</i>	Western Cattle Egret	LC	WS	R	L	P
<i>Ardea cinerea</i>	Grey Heron	LC	WS	R	M	P
<i>Ardea melanocephala</i>	Black-headed Heron	LC	WS	R	M	P
<i>Scopus umbretta</i>	Hamerkop	LC	WS	R	L	P
<i>Elanus caeruleus</i>	Black-winged Kite	LC	WS	R	L	P
<i>Milvus aegyptius</i>	Yellow-billed Kite	LC	WS	R	M	P
<i>Buteo augur</i>	Augur Buzzard	LC	WS	R	M	P
<i>Tyto alba</i>	Western Barn Owl	LC	WS	R	L	P
<i>Colius castanotus</i>	Red-backed Mousebird	LC	ES	R	L	P
<i>Urocolius indicus</i>	Red-faced Mousebird	LC	WS	R	L	P
<i>Upupa africana</i>	African Hoopoe	LC	WS	R	L	P
<i>Coracias caudatus</i>	Lilac-breasted Roller	LC	WS	R	L	P
<i>Halcyon chelicuti</i>	Striped Kingfisher	LC	WS	R	L	P
<i>Halcyon senegalensis</i>	Woodland Kingfisher	LC	WS	R	L	P
<i>Merops hirundineus</i>	Swallow-tailed Bee-eater	LC	WS	R	L	P
<i>Merops pusillus</i>	Little Bee-eater	LC	WS	M	L	R
<i>Merops superciliosus</i>	Olive Bee-eater	LC	WS	M	L	P
<i>Merops apiaster</i>	European Bee-eater	LC	WS	M	L	P
<i>Lybius torquatus</i>	Black-collared Barbet	LC	WS	R	L	P
<i>Falco rupicolus</i>	Rock Kestrel	LC	WS	R	L	P
<i>Falco biarmicus</i>	Lanner Falcon	LC	WS	R	M	P
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	LC	NE	R	L	P
<i>Tchagra australis</i>	Brown-crowned Tchagra	LC	WS	R	L	P
<i>Dryoscopus cubla</i>	Black-backed Puffback	LC	WS	R	L	P
<i>Laniarius aethiopicus</i>	Tropical Boubou	LC	WS	R	L	P
<i>Nilaus afer</i>	Brubru	LC	WS	R	L	P
<i>Prionops plumatus</i>	White-crested Helmetshrike	LC	WS	R	L	P
<i>Lanius minor</i>	Lesser Grey Shrike	LC	WS	M	L	P

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Lanius humeralis</i>	Northern Fiscal	LC	WS	R	L	R
<i>Oriolus larvatus</i>	Black-headed Oriole	LC	WS	R	L	P
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC	WS	R	L	P
<i>Terpsiphone viridis</i>	African Paradise Flycatcher	LC	WS	M	L	P
<i>Corvus capensis</i>	Cape Crow	LC	WS	R	L	P
<i>Corvus albus</i>	Pied Crow	LC	WS	R	L	R
<i>Mirafra africana</i>	Rufous-naped Lark	LC	WS	R	L	R
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC	WS	R	L	R
<i>Chlorocichla flaviventris</i>	Yellow-bellied Greenbul	LC	WS	R	L	P
<i>Psalidoprocne pristoptera</i>	Black Saw-wing	LC	WS	M	L	P
<i>Pseudhirundo griseopyga</i>	Grey-rumped Swallow	LC	WS	M	L	R
<i>Hirundo rustica</i>	Barn Swallow	LC	WS	M	L	P
<i>Hirundo angolensis</i>	Angola Swallow	LC	WS	R	L	P
<i>Hirundo smithii</i>	Wire-tailed Swallow	LC	WS	R	L	P
<i>Ptyonoprogne fuligula</i>	Rock Martin	LC	WS	R	L	P
<i>Delichon urbicum</i>	Common House Martin	LC	WS	M	L	P
<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC	WS	M	L	R
<i>Cecropis semirufa</i>	Red-breasted Swallow	LC	WS	M	L	P
<i>Cecropis senegalensis</i>	Mosque Swallow	LC	WS	M	L	P
<i>Sylvietta rufescens</i>	Long-billed Crombec	LC	WS	R	L	P
<i>Phylloscopus trochilus</i>	Willow Warbler	LC	WS	M	L	P
<i>Hippolais icterina</i>	Icterine Warbler	LC	WS	M	L	P
<i>Cisticola chiniana</i>	Rattling Cisticola	LC	WS	R	L	R
<i>Cisticola fulvicapilla</i>	Neddicky	LC	WS	R	L	P
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	WS	R	L	R
<i>Camaroptera brevicaudata</i>	Grey-backed Camaroptera	LC	WS	R	L	P
<i>Turdoides hartlaubii</i>	Hartlaub's Babbler	LC	WS	R	L	P
<i>Zosterops senegalensis</i>	African Yellow White-eye	LC	WS	R	L	P
<i>Lamprotornis nitens</i>	Cape Starling	LC	WS	R	L	R
<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	LC	WS	M	L	R
<i>Cossypha heuglini</i>	White-browed Robin-Chat	LC	WS	R	L	P
<i>Erythropygia leucophrys</i>	White-browed Scrub Robin	LC	WS	R	L	P
<i>Saxicola torquatus</i>	African Stonechat	LC	WS	R	L	R
<i>Oenanthe familiaris</i>	Familiar Chat	LC	WS	R	L	P
<i>Myrmecocichla nigra</i>	Sooty Chat	LC	WS	R	L	P
<i>Muscicapa striata</i>	Spotted Flycatcher	LC	WS	M	L	P
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	LC	WS	R	L	P
<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	LC	WS	R	L	P
<i>Cinnyris talatala</i>	White-bellied Sunbird	LC	WS	R	L	P
<i>Cinnyris venustus</i>	Variable Sunbird	LC	WS	R	L	P
<i>Cinnyris cupreus</i>	Copper Sunbird	LC	WS	R	L	P
<i>Passer domesticus</i>	House Sparrow	LC	WS	R	L	R

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC	WS	R	L	R
<i>Ploceus ocularis</i>	Spectacled Weaver	LC	WS	R	L	P
<i>Ploceus xanthops</i>	Holub's Golden Weaver	LC	WS	R	L	P
<i>Ploceus velatus</i>	Southern Masked Weaver	LC	WS	R	L	P
<i>Ploceus cucullatus</i>	Village Weaver	LC	WS	R	L	P
<i>Quelea quelea</i>	Red-billed Quelea	LC	WS	R	L	P
<i>Euplectes orix</i>	Southern Red Bishop	LC	WS	R	L	P
<i>Pytilia melba</i>	Green-winged Pytilia	LC	WS	R	L	P
<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	WS	R	L	P
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC	WS	R	L	R
<i>Estrilda astrild</i>	Common Waxbill	LC	WS	R	L	P
<i>Lonchura cucullata</i>	Bronze Mannikin	LC	WS	R	L	P
<i>Vidua chalybeata</i>	Village Indigobird	LC	WS	R	L	P
<i>Vidua purpurascens</i>	Purple Indigobird	LC	WS	R	L	P
<i>Vidua macroura</i>	Pin-tailed Whydah	LC	WS	R	L	P
<i>Motacilla capensis</i>	Cape Wagtail	LC	WS	R	L	P
<i>Anthus leucophrys</i>	Plain-backed Pipit	LC	WS	R	L	P
<i>Serinus flavivertex</i>	Yellow-crowned Canary	LC	WS	R	L	P
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	LC	WS	R	L	P

Legend:

1 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

2 (ENDEMISM): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

3 (SEASONALITY): R - Resident; M - Migratory

4 (RISK): H - High; M - Medium; L - Low

5 (PRESENCE): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 4

LIST OF MAMMALS

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
				<i>Potamogale velox</i>
<i>Canis adustus</i>	Side-striped Jackal	LC	WS	U
<i>Canis mesomelas</i>	Black-backed Jackal	LC	WS	U
<i>Lycaon pictus</i>	African Wild Dog	EN	WS	U
<i>Otocyon megalotis</i>	Bat-eared Fox	LC	WS	U
<i>Vulpes chama</i>	Cape Fox	LC	WS	U
<i>Acinonyx jubatus</i>	Cheetah	VU	WS	U
<i>Caracal caracal</i>	Caracal	LC	WS	U
<i>Felis silvestris</i>	Wild Cat	LC	WS	U
<i>Leptailurus serval</i>	Serval	LC	WS	U
<i>Panthera leo</i>	Lion	VU	WS	U
<i>Panthera pardus</i>	Leopard	VU	WS	U
<i>Atilax paludinosus</i>	Marsh Mongoose	LC	WS	U
<i>Helogale parvula</i>	Common Dwarf Mongoose	LC	WS	U
<i>Herpestes ichneumon</i>	Egyptian Mongoose	LC	WS	U
<i>Herpestes sanguineus</i>	Common Slender Mongoose	LC	WS	P
<i>Ichneumia albicauda</i>	White-tailed Mongoose	LC	WS	U
<i>Paracynictis selousi</i>	Selous's Mongoose	LC	WS	U
<i>Crocuta crocuta</i>	Spotted Hyaena	LC	WS	U
<i>Proteles cristata</i>	Aardwolf	LC	WS	U
<i>Aonyx capensis</i>	African Clawless Otter	NT	WS	U
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	NT	WS	U
<i>Ictonyx striatus</i>	Striped Polecat	LC	WS	U
<i>Mellivora capensis</i>	Honey Badger	LC	WS	U
<i>Poecilogale albinucha</i>	African Striped Weasel	LC	WS	U
<i>Civettictis civetta</i>	African Civet	LC	WS	U
<i>Genetta angolensis</i>	Miombo Genet	LC	WS	U
<i>Genetta genetta</i>	Common Genet	LC	WS	P
<i>Genetta maculata</i>	Large-spotted Genet	LC	WS	U
<i>Aepyceros melampus petersi</i>	Black-faced Impala	VU	WS	U
<i>Connochaetes taurinus</i>	Common Wildebeest	LC	WS	U
<i>Hippotragus equinus</i>	Roan Antelope	LC	WS	U
<i>Kobus ellipsiprymnus defassa</i>	Defassa Waterbuck	NT	WS	U
<i>Kobus leche leche</i>	Red Lechwe	NT	WS	U
<i>Oreotragus oreotragus</i>	Klipspringer	LC	WS	U
<i>Ourebia ourebi</i>	Oribi	LC	WS	U
<i>Philantomba monticola</i>	Blue Duiker	LC	WS	U
<i>Raphicerus campestris</i>	Steenbok	LC	WS	U
<i>Redunca arundinum</i>	Southern Reedbuck	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
				<i>Sylvicapra grimmia</i>
<i>Syncerus caffer caffer</i>	Cape Buffalo	NT	WS	U
<i>Tragelaphus oryx</i>	Common Eland	LC	WS	U
<i>Tragelaphus scriptus</i>	Bushbuck	LC	WS	U
<i>Tragelaphus spekii</i>	Sitatunga	LC	WS	U
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	WS	U
<i>Giraffa camelopardalis</i>	Giraffe	VU	WS	U
<i>Hippopotamus amphibius</i>	Hippopotamus	VU	WS	U
<i>Phacochoerus africanus</i>	Common Warthog	LC	WS	U
<i>Potamochoerus larvatus</i>	Bushpig	LC	WS	U
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat	LC	WS	U
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC	WS	U
<i>Chaerephon chapini</i>	Pale Free-tailed Bat	LC	WS	U
<i>Chaerephon nigeriae</i>	Nigerian Free-tailed Bat	LC	WS	U
<i>Mops niveiventer</i>	White-bellied Free-tailed Bat	LC	WS	U
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	WS	U
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	LC	WS	U
<i>Eidolon helvum</i>	Straw-coloured Fruit Bat	LC	WS	U
<i>Epomophorus angolensis</i>	Angolan Epauletted Fruit Bat	NT	NE	U
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	LC	WS	U
<i>Rhinolophus eloquens</i>	Eloquent Horseshoe Bat	LC	WS	U
<i>Rhinolophus lobatus</i>	Peters's Horseshoe Bat	LC	NE	U
<i>Glauconycteris variegata</i>	Variiegated Butterfly Bat	LC	WS	U
<i>Neoromicia capensis</i>	Cape Serotine	LC	WS	U
<i>Neoromicia grandidieri</i>	Dobson's Pipistrelle	DD	WS	U
<i>Neoromicia nana</i>	Bamana Bat	LC	WS	U
<i>Neoromicia zuluensis</i>	Zulu Serotine	LC	WS	U
<i>Nycticeinops schlieffeni</i>	Schlieffen's Bat	LC	WS	U
<i>Scotophilus dinganii</i>	Yellow-bellied House Bat	LC	WS	U
<i>Atelerix frontalis</i>	Southern African Hedgehog	LC	WS	U
<i>Heterohyrax brucei bocagei</i>	Bush Hyrax	LC	ES	U
<i>Lepus victoriae</i>	African Savanna Hare	LC	WS	P
<i>Pronolagus randensis</i>	Jameson's Red Rock Hare	LC	WS	U
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	LC	WS	U
<i>Equus quagga burchelli</i>	Plains Zebra	LC	WS	U
<i>Diceros bicornis bicornis</i>	South-western Black Rhino	CR	WS	U
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	VU	WS	U
<i>Cercopithecus mitis mitis</i>	Pluto Monkey	DD	ER	U
<i>Chlorocebus cynosuuros</i>	Malbrouck Monkey	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
				<i>Papio ursinus</i>
<i>Galago moholi</i>	Southern Lesser Galago	LC	WS	U
<i>Otolemur crassicaudatus</i>	Garnett's Greater Galago	LC	WS	U
<i>Loxodonta africana</i>	Savanna Elephant	NE	WS	U
<i>Fukomys bocagei</i>	Bocage's Mole Rat	LC	NE	U
<i>Fukomys mechowii</i>	Mechow's Mole Rat	LC	WS	U
<i>Graphiurus kelleni</i>	Kellen's Dormouse	LC	WS	U
<i>Graphiurus rupicola</i>	Stone Dormouse	LC	WS	U
<i>Hystrix africaeustralis</i>	Cape Porcupine	LC	WS	U
<i>Aethomys chrysophilus</i>	Red Rock Rat	LC	WS	U
<i>Dasymys cabrali</i>	Cabral's Marsh Rat	NE	ES	U
<i>Dasymys incommutus</i>	African Marsh Rat	LC	WS	U
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	WS	U
<i>Gerbilliscus paeba</i>	Hairy-footed Gerbil	LC	WS	U
<i>Mastomys natalensis</i>	Natal Multimammate Mouse	LC	WS	P
<i>Micaelamys namaquensis</i>	Namaqua Rock Rat	LC	WS	U
<i>Myomyscus angolensis</i>	Angolan Multimammate Mouse	LC	ES	U
<i>Zelotomys woosnami</i>	Woosnam's Broad-headed Mouse	LC	WS	U
<i>Cricetomys ansorgei</i>	Southern Giant Pouched Rat	LC	WS	P
<i>Dendromus leucostomus</i>	Monard's Gray African Climbing Mouse	DD	ES	U
<i>Dendromus melanotis</i>	Gray African Climbing Mouse	LC	WS	U
<i>Dendromus mystacalis</i>	Chestnut Climbing Mouse	LC	WS	U
<i>Dendromus nyikae</i>	Nyika Climbing Mouse	LC	WS	U
<i>Saccostomus campestris</i>	Southern African Pouched Mouse	LC	WS	U
<i>Steatomys krebsii</i>	Kreb's Fat Mouse	LC	WS	U
<i>Steatomys parvus</i>	Tiny Fat Mouse	LC	WS	U
<i>Pedetes capensis</i>	Spring Hare	LC	WS	U
<i>Funisciurus congicus</i>	Congo Rope Squirrel	LC	WS	P
<i>Crocidura erica</i>	Heather Shrew	DD	ES	U
<i>Crocidura fuscomurina</i>	Bicolored Musk Shrew	LC	WS	U
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	LC	WS	U
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	LC	WS	U
<i>Crocidura nigricans</i>	Blackish White-toothed Shrew	LC	ES	U
<i>Crocidura olivieri</i>	African giant shrew	LC	WS	U
<i>Crocidura parvipes</i>	Small-footed Shrew	LC	WS	U
<i>Orycteropus after</i>	Aardvark	LC	WS	U

Legend:

1 (LVEA): Angolan Red List for Threatened Species: NE (Not Evaluated), VuI (Vulnerable);

2 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

3 (**ENDEMISM**): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 (**SEASONALITY**): R - Resident; M - Migratory

5 (**RISK**): H - High; M - Medium; L - Low

6 (**PRESENCE**): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 5

AMPHIBIANS LIST

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de dados das Espécies de Anfíbios da Huíla					60KV DL
Ordem	Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	
Anura	<i>Xenopus petersii</i>	Peters' Clawed Frog	LC	WS	U
	<i>Mertensophryne mocquardi</i>	Mocquard's Toad	LC	WS	U
	<i>Sclerophys funerea</i>	Angolan Toad	LC	WS	U
	<i>Sclerophys garmani</i>	Garman's Toad	LC	WS	U
	<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	WS	P
	<i>Sclerophrys poweri</i>	Power's Toad	LC	WS	U
	<i>Sclerophrys pusilla</i>	Flat-backed Toad	LC	WS	L
	<i>Sclerophrys regularis</i>	African Common Toad	LC	WS	P
	<i>Phrynomantis bifasciatus</i>	Banded Ruber Frog	LC	WS	U
	<i>Breviceps adspersus</i>	Common Rain Frog	NE	WS	U
	<i>Hemismus marmoratus</i>	Marbled Snout-Burrower	LC	WS	U
	<i>Hyperolius angolensis angolensis</i>	Angolan Reed Frog	LC	WS	U
	<i>Hyperolius benguellensis</i>	Benguela Long Reed Frog	LC	WS	U
	<i>Hyperolius bocagei</i>	Bocage's Reed Frog	LC	WS	U
	<i>Hyperolius chelaensis</i>	Chela Mountain	DD	ES	U
	<i>Hyperolius cinereus</i>	Ashy Reed Frog	LC	ES	U
	<i>Hyperolius concolor</i>	Variable Reed Fro	LC	WS	U
	<i>Hyperolius nasutus</i>	Large-Nosed Long Reed Frog	LC	WS	P
	<i>Kasina kuvangensis</i>	Kuvangu kasina	LC	WS	U
	<i>Kasina senegalensis</i>	Senegal kasina	LC	WS	P
	<i>Leptopelis anchietae</i>	Anchieta's Tree Frog	LC	ES	U
	<i>Leptopelis bocagii</i>	Bocage's Tree Frog	LC	WS	U
	<i>Leptopelis cynamoneus</i>	Angolan Forest Tree Frog	LC	WS	U
	<i>Hildebrandtia ornata</i>	Ornate Frog	LC	WS	U
	<i>Hildebrandtia ornatissima</i>	Angola Ornate Frog	DD	ES	U
	<i>Ptychadena anchietae</i>	Anchieta's Grass Frog	LC	WS	P
	<i>Ptychadena ansorgii</i>	Ansorge's Grass Frog	LC	WS	U
	<i>Ptychadena bunoderma</i>	Rough Grass Frog	LC	WS	U
	<i>Ptychadena grandisonae</i>	Grandison's Grass Frog	LC	WS	U
	<i>Ptychadena mascareniensis</i>	Mascarene Grass Frog	LC	WS	U
	<i>Ptychadena oxyrhynchus</i>	Sharp-Nosed Grass Frog	LC	WS	U
	<i>Ptychadena porosissima</i>	Striped Grass Frog	LC	WS	U
	<i>Phrynobatrachus cryptotis</i>	Cryptic River Frog	DD	WS	U
	<i>Phrynobatrachus mababiensis</i>	Mababe Puddle Frog	DD	WS	U
<i>Phrynobatrachus natalensis</i>	Natal Dwarf Puddle Frog	LC	WS	P	
<i>Amietia angolensis</i>	Angola River Frog	LC	WS	U	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	LC	WS	U	
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	WS	U	
<i>Tomoptera tuberculosa</i>	Rough Sand Frog	LC	WS	P	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de dados das Espécies de Anfíbios da Huíla					60KV DL
Ordem	Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	
					PRESENCE
	<i>Amnirana darlingi</i>	Darling's White - Lipped Frog	LC	WS	U

Legend:

1 (LVEA): Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

3 (ENDEMISM): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 (SEASONALITY): R - Resident; M - Migratory

5 (RISK): H - High; M - Medium; L - Low

6 (PRESENCE): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 6

REPTILES LIST

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
				<i>Pelomedusa subrufa</i>
<i>Pelusios nanus</i>	African Dwarf Mud Turtle	NE	WS	U
<i>Pelusios rhodesianus</i>	Variable Mud Turtle	LC	WS	U
<i>Kinixys spekii</i>	Spek's Hinged-Back Tortoise	NE	WS	U
<i>Stigmochelys pardalys</i>	Leopard Tortoise	LC	WS	U
<i>Crocodylus niloticus</i>	Nile Crocodile	LC	WS	U
<i>Afroedura vazpintorum</i>	Coastal Flat Gecko	NE	ES	U
<i>Conrodactylus fitzsimonsi</i>	Button-Scaled Thick-Toed Gecko	NE	WS	U
<i>Conrodactylus laevigatus</i>	Button-Scaled Thick-Toed Gecko	NE	WS	U
<i>Hemidactylus mabouia</i>	Tropical House Gecko	NE	WS	L
<i>Hemidactylus benquellensis</i>	Benguela Tropical Gecko	NE	WS	P
<i>Lygodactylus nyanyeka</i>	Nyaneka Dwarf Gecko	NE	WS	P
<i>Pachydactylus angolensis</i>	Angolan Thick-Toed Gecko	NE	ES	U
<i>Pachydactylus punctatus</i>	Speckled Thick-Toed Gecko	NE	WS	P
<i>Pachydactylus scherzi</i>	Scherz's Thick-Toed Gecko	NE	WS	U
<i>Rhoptropus montanus</i>	Mountain Namib Day Gecko	NE	WS	U
<i>Dalophia pistillum</i>	Blunt-Tailed Worm Lizard	NE	WS	U
<i>Monopeltis anchietae</i>	Anchieta's Worm Lizard	NE	WS	U
<i>Monopeltis perplexus</i>	Wedge-Snouted Worm Lizard	NE	ES	U
<i>Ichnotropis bivittata bivittata</i>	Angolan Rough-Scale Lizard	NE	WS	U
<i>Ichnotropis bivittata pallida</i>	Cape Rough-Scaled Lizard	NE	ER	U
<i>Meroles squamulosa</i>	Common Rough-Scaled Lizard	NE	WS	U
<i>Nucras tessellata</i>	Western Sandveld Lizard	NE	WS	U
<i>Pedioplanis benquellensis</i>	Bocage's Sand Lizard	NE	WS	U
<i>Chamaesaura miopropus</i>	Zambian Snake Lizard	NE	WS	U
<i>Cordylus angolensis</i>	Angolan Girdled Lizard	NE	ES	U
<i>Cordylus machadoi</i>	Machado's Girdled Lizard	NE	NE	U
<i>Gerrhosaurus nigrolineatus</i>	Black-Lined Plated Lizard	NE	WS	P
<i>Matobosaurus maltzahni</i>	Western Giant Plated Lizard	NE	WS	U
<i>Eumecia anchietae anchietae</i>	Western Serpentineform Skink	NE	WS	U
<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	LC	WS	U
<i>Panaspis cabindae</i>	Cabinda Snake-Eyed Skink	DD	WS	U
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-Eyed Skink	NE	WS	U
<i>Sepsina angolensis</i>	Angolan Reduced-Limb Skink	NE	WS	U
<i>Trachylepis albopunctata</i>	Angolan Variable Skink	NE	WS	P
<i>Trachylepis bayonii</i>	Bayão's Skink	DD	WS	U
<i>Trachylepis binotata</i>	Ovambo Tree Skink	NE	WS	U
<i>Trachylepis chimbana</i>	Chimba Skink	NE	WS	U
<i>Trachylepis monardi</i>	Monard's Skink	NE	ES	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Trachylepis punctulata</i>	Speckled Sand Skink	NE	WS	U
<i>Trachylepis sulcata</i>	Western rock Skink	NE	WS	L
<i>Trachylepis wahlbergii</i>	Wahlberg's Striped Skink	NE	WS	U
<i>Varanus albigularis angolensis</i>	Angolan White-Throated Monitor	LC	WS	U
<i>Varanus niloticus</i>	Nile Monitor	LC	WS	U
<i>Chamaeleo anchietae</i>	Anchieta's Chameleon	LC	WS	U
<i>Chamaeleo dilepis quilensis</i>	Quilo Flap-Neck Chameleon	LC	WS	U
<i>Acanthocercus cyanocephalus</i>	Angolan Tree Agama	LC	WS	U
<i>Agama aculeata</i>	Western Ground Agama	LC	WS	P
<i>Agama schacki</i>	Schack's Rock Agama	NE	ES	R
<i>Afrotyphlops anomalus</i>	Angolan Giant Blind Snake	NE	ES	U
<i>Afrotyphlops schlegelii</i>	Schlegel's Giant Blind Snake	NE	WS	U
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	NE	WS	U
<i>Namibiana rostrata</i>	Angolan Beaked Thread Snake	DD	ES	U
<i>Python natalensis</i>	Southern African Rock Python	NE	WS	U
<i>Bitis arietans</i>	Puff Adder	NE	WS	U
<i>Bitis caudalis</i>	Horned Adder	NE	WS	U
<i>Bitis gabonica</i>	Gabon Adder	NE	WS	U
<i>Bitis heraldica</i>	Angolan Adder	NE	ES	U
<i>Causus bilineatus</i>	Two-Striped Night Adder	NE	WS	U
<i>Causus rhombeatus</i>	Rhombic Night Adder	NE	WS	U
<i>Aparallactus capensis</i>	Cape Centipede Eater	LC	WS	U
<i>Atractaspis congica</i>	Congo Stiletto Snake	NE	WS	U
<i>Boaedon angolensis</i>	Angolan House Snake	NE	ES	P
<i>Hemirhagerrhis viperina</i>	Western Bark Snake	NE	WS	U
<i>Limaformosa capensis</i>	Southern File Snake	LC	WS	U
<i>Lycophidion multimaclatum</i>	Spotted Wolf Snake	NE	WS	U
<i>Prosymna angolensis</i>	Angola Shovel-Snout snake	LC	WS	U
<i>Prosymna visseri</i>	Visser's Shovel-Snout Snake	NE	WS	U
<i>Psammophis angolensis</i>	Dwarf Sand Snake	NE	WS	U
<i>psammophis ansorgii</i>	Link-Marked Sand Racer snake	NE	ES	U
<i>Psammophis leopardinus</i>	Leopard Sand Snake	NE	WS	U
<i>Psammophis mossambicus</i>	Olive Whip Snake	NE	WS	U
<i>Psammophis subtaeniatus</i>	Striped-Bellied Sand Snake	LC	WS	U
<i>Psammophylax acutus</i>	Striped Beaked Snake	NE	WS	U
<i>Psammophylax rhombeatus ocellatus</i>	Spotted Skaapsteker Snake	NE	ES	U
<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker Snake	LC	WS	P
<i>Pseudaspis cana</i>	Mole Snake	NE	WS	U
<i>Dendroaspis polylepis</i>	Black Mamba	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Elapsoidea guntherii</i>	Gunther's Garter Snake	NE	WS	U
<i>Elapsoidea semiannulata semiannulata</i>	Angolan Garter Snake	NE	WS	U
<i>Naja anchietae</i>	Anchieta's Cobra	NE	WS	P
<i>Naja melanoleuca</i>	Forest Cobra	NE	WS	U
<i>Naja nigricollis</i>	Black-Necked Spitting Cobra	NE	WS	U
<i>Crotaphopeltis hotamboeia</i>	Red-Lipped Snake	NE	WS	U
<i>Dasypeltis palmarum</i>	Palm Egg Eater	NE	WS	U
<i>Dasypeltis scabra</i>	Common Egg Eater	LC	WS	U
<i>Dispholidus typus punctatus</i>	Spotted Boomslang	NE	WS	U
<i>Philothamnus angolensis</i>	Angolan Green Snake	NE	WS	U
<i>Philothamnus dorsalis</i>	Striped Green Snake	NE	WS	U
<i>Philothamnus heterolepidotus</i>	Slender Green Snake	NE	WS	U
<i>Philothamnus ornatus</i>	Ornate Green Snake	NE	WS	U
<i>Philothamnus semivariegatus</i>	Spotted Bush Snake	NE	WS	U
<i>Thelotornis capensis oatesi</i>	Oate's Twig Snake	LC	WS	U
<i>Limnophis bicolor</i>	Bicolored Swamp Snake	NE	WS	U
<i>Natriciteres bipostocularis</i>	Southwestern Forest Marsh snake	NE	WS	U

Legend:

1 (LVEA): Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

3 (ENDEMISM): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 (SEASONALITY): R - Resident; M - Migratory

5 (RISK): H - High; M - Medium; L - Low

6 (PRESENCE): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 1
HOLÍSTICOS CERTIFICATE

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province



República de Angola

MINISTÉRIO DA CULTURA, TURISMO E AMBIENTE

GABINETE JURIDICO

CERTIFICADO DE CONSULTORIA AMBIENTAL

N.º 12159922221

O Gabinete Jurídico do Ministério da Cultura, Turismo e Ambiente, atesta que foram cumpridas todas as formalidades legais conducentes ao Registo Técnico da Sociedade de Consultoria Ambiental HOLISTICOS SERVICOS, EST.& CONSULTORIA, LIMITADA, nos termos do Decreto Executivo nº 86/12, de 23 de Fevereiro de 2012, que aprova o Regulamento sobre o Registo Técnico de Sociedade de Consultoria Ambiental.

Emitida em, 25 de Março de 2022	Válida até, 25 de Março de 2023
------------------------------------	------------------------------------

Assinatura

DANIEL JOÃO JORGE
Gabinete Jurídico

(DIRECTOR DO GABINETE JURÍDICO)



A autenticidade deste documento poderá ser verificada através dos passos a seguir:
1. Aceda ao Portal MINAMB (<https://sia.minamb.gov.ao/validacaodocumentos>)
2. Introduza o código RCONST-MT120TY2Mzk= no campo "Código de Validação"
3. Clique em "Pesquisar"
Número do Certificado: 12159922221



APPENDIX 2

WASTE MANAGEMENT PLAN



Waste Management Plan for the 60 kV Distribution Line Project Between 220/60 kV East Lubango Substation and 60/15 kV Arimba Substation in Lubango, Huíla Province

FINAL





Waste Management Plan for the 60 kV Distribution Line Project Between 220/60 kV East Lubango Substation and 60/15 kV Arimba Substation in Lubango, Huíla Province



Cliente:

Empresa Nacional de Distribuição de Electricidade – E.P.

Endereço: Cónego Manuel Das Neves 234, Luanda

Telefone: (+244) 222 641 760.

Website: www.ende.co.ao/

Pessoa de Contacto (ENDE)

Sr. Luciano Vidal Gonçalves

Telefone: (+244) 925 471 166

E-mail: vidalgoncalves@yahoo.com.br

Tokyo Electric Power Services Co., Ltd. (TEPCO)

Endereço: 9F KDX Toyosu Grand Square 1-7-12

Shinonome, Koto-Ku, Tokyo 135-00662 Japan

Telepfone: (+813) 6372 5183

Website: www.tepsco.co.jp

Version	Date	Description
V.1	02/02/2022	Final document for submission to authorities

Consultor

Holísticos, Lda. – Serviços, Estudos & Consultoria

Rua 60, Casa No. 559

Urbanização Harmonia

Lar do Patriota

Luanda, Angola

Telefone:

(+244) 927 442 844

(+244) 915 034 779

(+244) 226 434 549

E-mail:

holisticos@holisticos.co.ao

Website:

www.holisticos.co.ao

Facebook:

<http://www.facebook.com/holisticos.angola>

**Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province**

Table of Contents

1	INTRODUCTION.....	1
1.1	Project Promoters and Consultancy Company.....	2
1.2	Objectives of the Waste Management Plan.....	5
1.3	Scope of the WMP	6
1.4	Methodology for the Preparation of the WMP.....	6
1.5	Waste Management Policy	7
1.6	Responsibilities.....	8
1.6.1	Responsibilities of the EHS Manager.....	10
1.6.2	Collective Responsibility.....	11
1.6.3	Waste Management Companies	14
1.7	Emergency Response Plan	15
1.8	ENDE and EPC EHS Policy	15
2	PROJECT DESCRIPTION	17
2.1	Project Location.....	17
2.2	Description of the 60 kV Distribution Line.....	17
2.3	Worker's Camp.....	19
2.4	Tower Structure Options	19
2.5	Arimba Substation Description	20
2.6	Water and Electricity	21
2.7	Workforce and Investment Budget	21
2.8	Operation and Maintenance Phase	21
3	APPLICABLE ANGOLAN LAWS AND LEGISLATION	23
4	WASTE MANAGEMENT	25
4.1	Waste Management Strategy	25
4.2	Classification and Categorization of Waste	26
4.2.1	Non-Hazardous Waste	28
4.2.2	Hazardous Waste.....	29

<i>Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province</i>	
4.3	Internal Conditioning and Identification of Waste 32
4.4	Waste Collection and Transportation 39
4.5	Waste Recovery 41
4.6	Final Waste Disposal 42
4.7	Types of Expectable Waste 42
5	WASTEWATER & EFFLUENT MANAGEMENT45
6	AIR EMISSIONS MANAGEMENT45
7	OCCUPATIONAL HEALTH AND SAFETY46
8	CONTINUOUS IMPROVEMENT, MONITORING AND REPORTING47
	Annex 1 – Annual Management Report Form47
	Annex 2 – Cargo Manifest Form.....48
	Annex 3 – Holísticos Certification50
	Annex 4 – ENDE E.P. Official Gazette.....51
	Annex 5 – Tax Identification Number52
	Annex 6 – Location Map of the 60 kV DL Project53
	Annex 7 – Location Map of the Arimba Substation.....54

List of Figures

Figure 1:	Flowchart representing the best waste management practices.5
Figure 2:	Continuous improvement process of the Waste Management Plan.8
Figure 3:	EPC Provisional organigram.....9
Figure 4:	Type of tower structure proposed to use in 60 kV TL Project (suspension and tension)..... 20
Figure 5:	Layout of Arimba substation. Source: JICA, 2021..... 20
Figure 6:	Example of a metallic skip..... 32
Figure 7:	Tooling container to be used for metal storage..... 33
Figure 8:	Types of plastic containers to be placed on the construction site. 34
Figure 9:	Polyethylene container to store used oil (left) and used batteries or other hazardous waste (right). 35
Figure 10:	Types of receptacles to store health care waste and used batteries..... 35
Figure 11:	Types of containers for storing health care waste. 36
Figure 12:	Spill clean-up kits to be installed on site..... 36
Figure 13:	Colour code to be used in the waste identification. 37
Figure 14:	Dumpers expected to be used for waste collection inside the worker’s camp..... 39
Figure 15:	Dump truck for waste collection. 40

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

List of Tables

Table 1: Contacts of the Project Promoter.	3
Table 2: Contacts of the Consultant Company.	3
Table 3: Responsibilities in the implementation of the WMP.	9
Table 4: Description of duties of the WMP Officer.	12
Table 5: Responsibilities of the institutions engaged in the WMP.	12
Table 6: Overview of Legislation used to draft the WMP.	23
Table 7: Type of waste and LAR code.	26
Table 8: List of hazardous waste characteristics.	30
Table 9: Hazardous waste identification.	37
Table 10: Types of waste produced and expected in the Project.	43

List of Acronyms

AE	Any EPC employee.
ANR	<i>Agência Nacional de Resíduos</i> (National Waste Agency)
CWC	Contracted Waste Collection Company
EHS	Environment, Health and Safety
ENDE	<i>Empresa Nacional de Distribuição de Electricidade</i> (National Company for Electricity Distribution)
EPC	Engineering, Procurement and Construction
ESMP	Environmental and Social Management Plan
JICA	Japan International Cooperation Agency
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
MW	Megawatts
ODA	Japanese Official Development Assistance
PPE	Personal Protective Equipment
PRODEL	<i>Empresa Pública de Produção de Electricidade</i> (Public Company for Electricity Production)
RoW	Right of Way
TEPCO	Tokyo Electric Power Services Co., Ltd.
WMP	Waste Management Plan

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

1 INTRODUCTION

All environmental aspects of the implementation activities for the construction of the 60 kV Distribution Line (DL) Project should be monitored and managed in an integrated manner through robust Environmental Management Systems, which should include a Waste Management Plan with the objective of presenting a set of actions and technical-operational strategies aimed at managing the expected waste. A properly implemented Waste Management Plan will allow the mitigation and control of potential impacts associated with waste (solid, liquid and gaseous) and may guarantee safe and healthy environmental results during the 60 kV Distribution Line (DL) Project, which also includes the construction of the Arimba substation.

This document presents the Waste Management Plan for in the installation of a 60 kV (DL) of approximately 10 km, between the East Lubango and the Arimba Substations, promoted by the National Company for Electricity Distribution, Public Company (hereinafter referred to as **ENDE**) in partnership with Japan International Cooperation Agency (hereinafter referred to as **JICA**) and their contractor, Tokyo Electric Power Services Co., Ltd. (hereinafter referred to as **TEPCO**).

ENDE, JICA and TEPCO are committed to quality, transparency, respect for the environment, health and safety of employees and society in general. In this context, in order to ensure the environmental sustainability of the installation of the 60 kV DL and Arimba substation they decided to draw up a Waste Management Plan in order to reduce and better manage the waste expected from the execution of the construction works of the substation and high voltage distribution line.

Furthermore, with the entry into force of Presidential Decree no. 190/12 of 24th August (Regulation on Waste Management), all public or private entities that produce waste or carry out activities related to waste management are now obliged to draw up a Waste Management Plan for their daily activities. This Plan is based on the principles of waste minimization at source, identifying and describing management actions, including aspects related to waste reduction, reuse, segregation and internal conditioning. It also commits to manage waste using a set of procedures to be implemented in order to protect the environment.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

1.1 PROJECT PROMOTERS AND CONSULTANCY COMPANY

According to the request from the Government of Angola to the Government of Japan, the 60 kV DL Project is expected to be implemented as a Japanese Official Development Assistance (ODA) loan Project, and the National Company for Electricity Distribution (ENDE) is the **Project Proponent**, Angolan entity representative. The preparatory survey for this Project has been implemented under the supports of Japan International Cooperation Agency (JICA) in 2021 with their contractor, Tokyo Electric Power Services Co., Ltd. (TEPCO).

JICA aims to contribute to international cooperation promotion, as well as the development of the Japanese and global economy by supporting the socioeconomic development, recovery or economic stability of developing regions. In accordance with the Development Cooperation Charter, JICA will work on human security and quality growth, and with its partners will take the lead in forging bonds of trust across the world, aspiring for a free, peaceful and prosperous world where people can hope for a better future and explore their diverse potentials.

TEPCO was established in December 1960 as an affiliated company of Tokyo Electric Power Company, Incorporated (TEPCO) to provide consulting services for electric power industry. TEPCO services cover power sector studies, master plans and feasibility studies supported by multilateral donors such as JICA, World Bank (WB) and Asian Development Bank (ADB). In developing countries facing power sector challenges, TEPCO also carries out project management services (including designs, contract management and construction supervision), with the objective of guaranteeing the sustainability of the Project.

ENDE, the National Company for Electricity Distribution, is a public company with the responsibility of distributing electricity, integrating all the activities and assets of former Luanda Electricity Company (EDEL) and the distribution assets of former National Electricity Company (ENE). ENDE is a company committed to environmental, health and safety issues at work and sustainability in general of all the projects which are coordinated on behalf of the State. The company contacts are shown in **Table 1**.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Table 1: Contacts of the Project Promoter.

Company	
Company name	National Company for Electricity Distribution (ENDE)
Commercial Registry Number	5410778170
Address	Cónego Manuel Das Neves 234, Luanda
Contacts	(+244) 222 641 760
Website	http://www.ende.co.ao
Legal Representative	
Nome	Hélder de Jesus Garcia Adão
Position	Chief Executive Officer (CEO)
Telephone	+ 244 926 578 834
E-mail	Helder_adao@hotmail.com

For the Waste Management Plan development report, **Tokyo Electric Power Services Co., Ltd.**, awarded a contract to **Holísticos – Serviços, Estudos & Consultoria, Lda.** Which developed this report. Holísticos is an Angolan environmental consulting company, established in 2006, with its headquarters in Luanda, registered in the Ministry of Culture, Tourism and Environment (see **Appendix 3**). Holísticos has a team of dynamic and multidisciplinary specialists with vast work experience in environmental and social issues in Angola (see **Table 2** contact details).

However, the statement and the Waste Management Plan certificate should be issued in the name of the ENDE as **Project Proponent**.

Table 2: Contacts of the Consultant Company.

Company	
Company name	Holísticos, Lda. – Serviços, Estudos & Consultoria
Commercial Registry number	299-06
Taxpayer number	5401156421
Environmental Consultant registration number at the Ministry of Culture, Tourism and Environment (MCTA)	4799693215
Address	Urbanização Harmonia, Rua 60, Casa 559, Lar do Patriota, Talatona, Luanda
Telephone	(+244) 226 434 549 / 927 442 844 / 912 034 779

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Company	
Website	www.holisticos.co.ao
Legal representative	
Name	Miguel Morais, Managing Partner
Address	Rua 60, Casa 559, Urbanização Harmonia
Telephone	+244 923 41 01 86
Post office box (Caixa Postal)	2426 Apartado IV
E-mail	holisticos@holisticos.co.ao

This Waste Management Plan (hereinafter referred to as **WMP**) aims to adjust the waste management of the 60 kV DL Project from the production to the final destination, according to the current legislation, in order to ensure that potential impacts caused by third parties are not subsequently imputed to ENDE, JICA, TEPCO and EPC.

This plan also aims to conform the construction of the 60 kV distribution line to current environmental legislation regarding the management of construction waste, domestic waste, and waste from electrical and electronic equipment, among others. The flowchart in **Figure 1**, adapted from Presidential Decree No. 190/12 of August 24th, illustrates the good environmental practices applicable to waste management (urban solid waste and similar) that will be implemented during the construction works of the Project.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

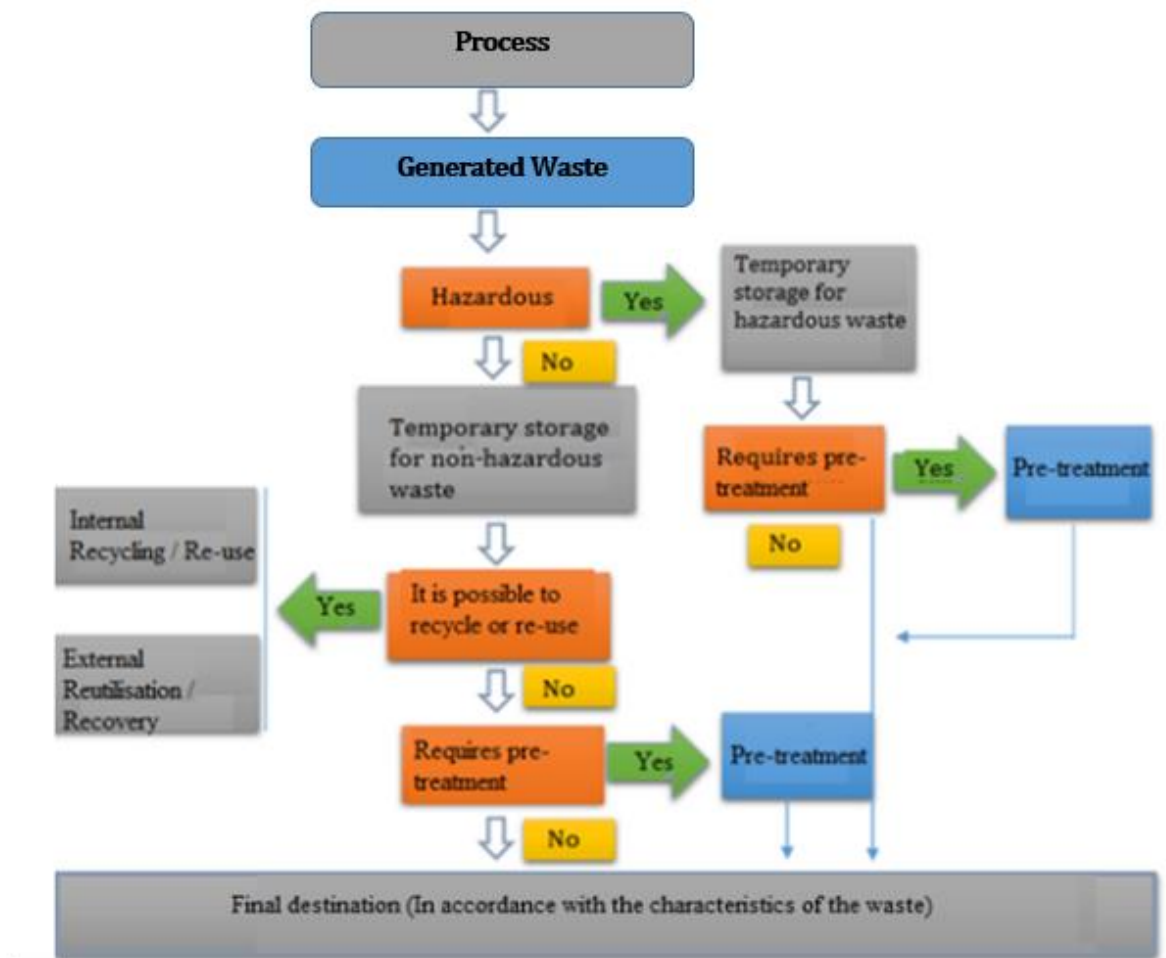


Figure 1: Flowchart representing the best waste management practices.

1.2 OBJECTIVES OF THE WASTE MANAGEMENT PLAN

The main objective of the Waste Management Plan (WMP) is to plan the actions to be taken in waste management during the construction phase of the 60 kV DL Project between East Lubango and Arimba substations. It also aims to identify good waste management practices from the construction sector and the electricity distribution line activities, which may include the use of chemicals or other potentially polluting compounds. The WMP is based on a participative model, among the Engineering, Procurement and Construction (EPC¹), subcontractors' and ENDE's company staff, from which we can summarise the main objectives:

¹ EPC will be the entity responsible for implementing this plan throughout the construction phase until all supporting infrastructure is removed and the distribution line commissioned.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

- To assist the Site Management in the management of the construction waste, allowing to overcome limitations and to consolidate an efficient and sustainable management system;
- To identify good waste management practices in the construction sector and in the electricity transport industry that can serve as an example for the work;
- To ensure compliance with the legal requirements in force in Angola and other good environmental practices on waste management;
- To prevent environmental, business and civil liability risks resulting from the inadequate management of construction waste;
- To present different types and quantities of waste foreseen;
- To present different ways of treatment and/or recovery of the waste produced;
- To present different ways to promote the implementation of the six (6) R's principles, namely: Rethink, Reduce, Reuse, Repair, Refuse and Recycle.

1.3 SCOPE OF THE WMP

This WMP will be applied to all activities developed by EPC and the subcontractor companies during the construction works. For the observance of this Plan all company employees are bound to it, namely: senior project managers, site foremen, on-site employees, service providers, suppliers and possible visitors to the site. The WMP covers both the construction of the 6' kV distribution line and the construction of the Arimba Substation. The construction of the East Lubango Substation is out of this scope as it is part of the 220 kV Transmission Line Project which will be implemented by RNT as has its own separate Waste Management Plan.

1.4 METHODOLOGY FOR THE PREPARATION OF THE WMP

For the WMP compilation, the methodological assumptions outlined in Presidential Decree No. 190/12 of 24th August were considered, as well as consultation of various documents on good waste management practices in the civil construction and distribution line sectors, and assessment of waste disposal sites in Lubango municipality. As part of the Project, public hearings were also held with the authorities of Huíla province, where, among the different issues addressed, the following issues were also discussed:

- Characterisation of the waste management services in the municipalities of Lubango, included in the routes (companies accredited by the Agência Nacional de Resíduos –

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

National Waste Agency) that operate waste collection services), identifying the models and constraints in all management stages: in waste collection and conditioning, in transport and final destination, in treatment or recovery;

- Perception of the attitudes and behaviours of the Project Promoter regarding construction waste management issues, together with hygiene, health and safety aspects at work;
- Characterisation of the type of waste expected, the form of treatment and recovery and the proposal of alternatives considered feasible;
- Identification of efficient storage and recovery models;
- Bibliographic consultation (books, magazines, relevant legislation, etc.) for information about the typical characteristics of the waste linked to the Project.

1.5 WASTE MANAGEMENT POLICY

This WMP is intended for the construction phase of the 60 kV DL Project, and associated infrastructure, based on a commitment to environmental, social and corporate sustainability, including implementing, whenever deemed necessary, the procedure for continuous improvement through the assessment and verification of all the processes that are part of the plan itself. **Figure 2** illustrates how the process of continuous improvement recommended for the WMP will be implemented in order to make it practical and feasible. In order to guarantee the continuous improvement of the plan, a set of subsequent steps of continuous improvement will be developed within the scope of the environmental, health and safety policy of the company, which will be developed to respond to several environmental issues.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

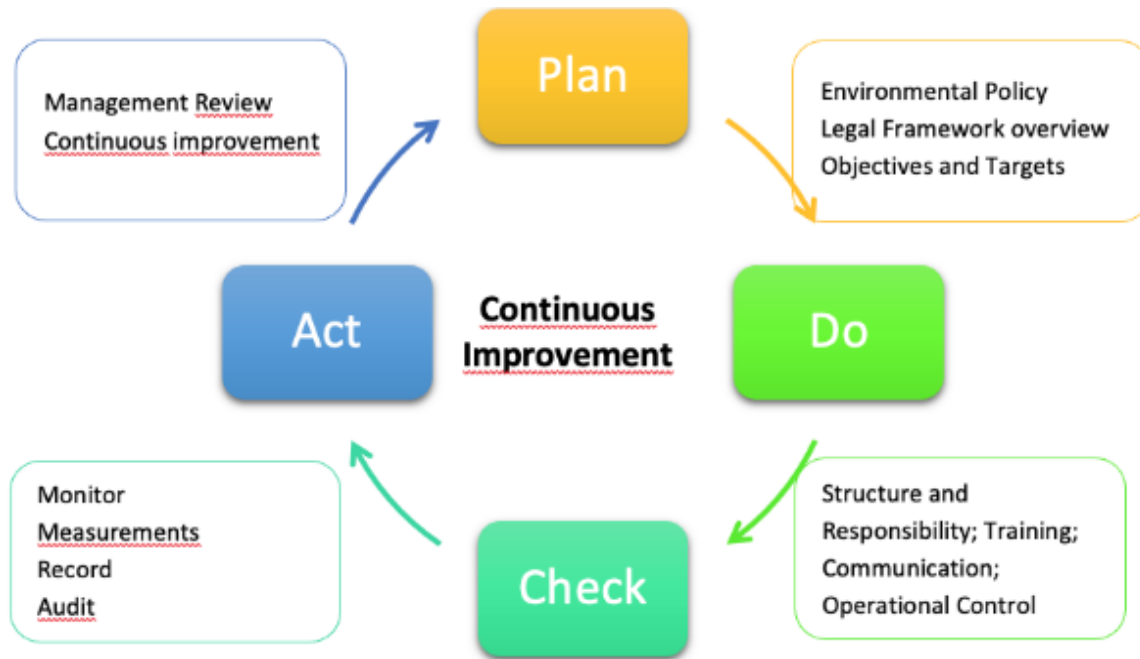


Figure 2: Continuous improvement process of the Waste Management Plan.

However, these steps will be based on five (5) pillars, namely:

- **Deep knowledge** of the construction waste from DL and related infrastructure;
- **Analysis** of the residues to be expected at the construction site and in the worker's camp (forms of segregation, conditioning, treatment, recovery and final destination);
- **Planning** (organisation of activities);
- **Environmental performance indicators** (volume of waste produced per month);
- Back to the **beginning of the process**.

1.6 RESPONSIBILITIES

EPC will be the entity responsible for implementing this plan throughout the construction phase until all supporting infrastructure is removed. The general responsibilities for the implementation of the WMP in the EPC overall structure are illustrated in **Figure 3** (Environmental, Health and Safety Manager).

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

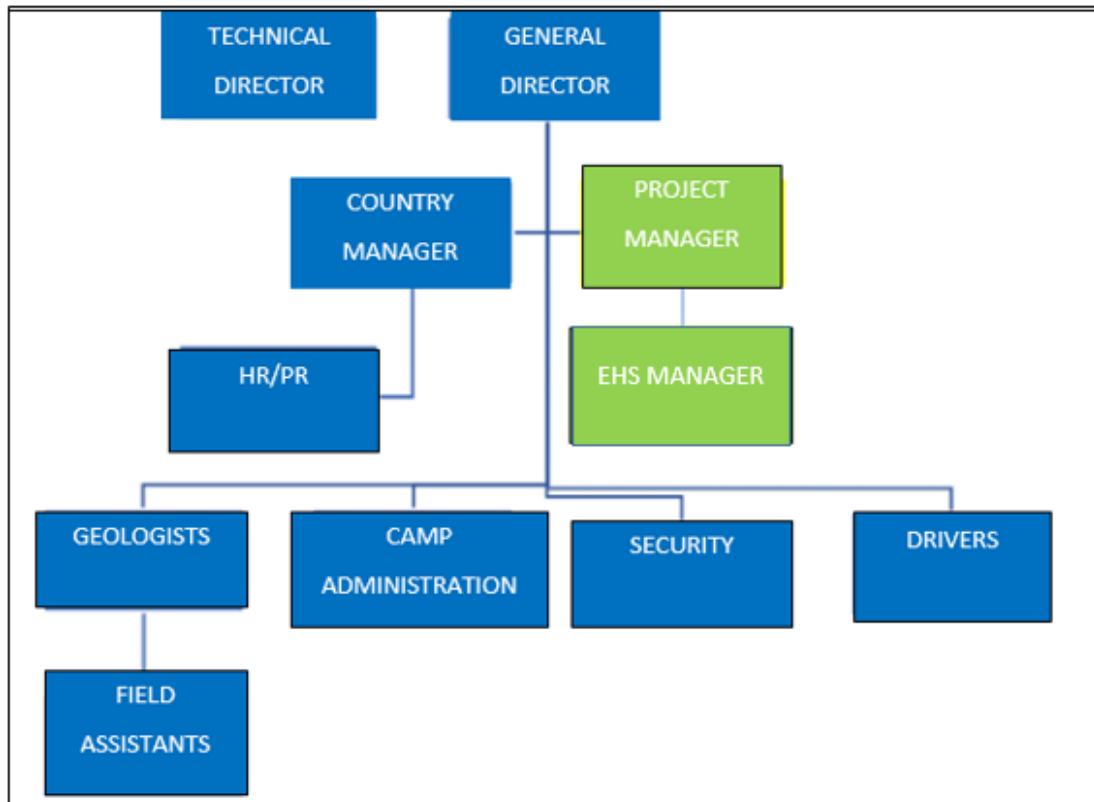


Figure 3: EPC Provisional organigram.

The main party responsible for maintaining and reviewing the procedures in this Plan, whenever deemed pertinent and in accordance with the deadlines established in the applicable legislation in force, will be the EPC. All EPC workers will have waste management responsibilities in accordance with the procedures defined in this Plan. **Table 3** presents the distribution of responsibilities in the execution of waste management tasks.

Table 3: Responsibilities in the implementation of the WMP.

ACTIONS	EPC	CWC	AE
Implement the Waste Management Plan.	R	P	P
Request approval of the WMP from the National Waste Agency.	R	I	
Identify and classify the waste produced on the site.	R		P
Identify the temporary storage sites for construction waste and the different forms of recovery on site.	R		P

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

ACTIONS	EPC	CWC	AE
Collect waste produced on site and package it in accordance with the applicable legislation in the worksite.	I	I	R
Select and manage contracts with companies responsible for the collection, transportation and final disposal of construction waste and associated infrastructure.	R	P	
Collect and transport the Project waste to the location indicated by the provincial government. Completion of the cargo manifest for the hazardous waste collected		R	
Raise awareness of waste management procedures among employees and possible visitors to the site.	R	R	P
Review and update the Waste Management Plan.	R		P

Legend:

R – Responsible; P – Participate; I – Inform;

CWC – Contracted Waste Collection Company

AE – Any EPC employee.

1.6.1 RESPONSIBILITIES OF THE EHS MANAGER

Under this WMP, the EPC EHS Manager will be responsible for:

- Introduction of staff at all levels with regard to environmental and social aspects of their duties;
- Training of staff through departmental meetings and debriefings to discuss occupational safety issues – may include assigning responsibilities to section managers for task specific training and develop extra training techniques;
- Provide weekly updates at management meetings on environmental, health and safety performance;
- Conduct formal and informal site inspections to assess overall performance and assist in the development of method statements, action plans and corrective actions as required;

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

- Respond to environmental incidents and supervise corrective actions such as clean-up operations;
- Develop/update management plans (e.g., emergency preparedness and response plans, waste management plans, health and safety procedures);
- Monitor the provision and use of personal protective equipment (PPE);
- Maintain a record of incidents and complaints; and
- Propose practical mitigation, management and monitoring for inclusion in the Environmental and Social Management Plan (ESMP), including this WMP.

1.6.2 COLLECTIVE RESPONSIBILITY

ENDE and all people involved in the management of the generated waste (EPC and subcontractors' employees) will ensure that the waste generated by their operations and activities is properly managed and that all activities related to the WMP are developed and implemented in accordance with the provisions of the WMP. All employees must contribute to ensuring that procedures are followed and that waste is disposed of in the appropriate places and containers provided.

Employees (bricklayers, foremen, electricians, painters, drivers, etc.) must be involved in the implementation of the plan, segregating waste and storing it in designated areas, following the procedures for cleaning, collection, identification, transportation and storage of all waste. The EPC will be responsible for training and informing each worker of their responsibilities with regard to the management of construction and others wastes. The training sessions will have, among others, the following purposes:

- Always keep internal waste storage areas clean, tidy and free from insects, animals, unpleasant odours or debris;
- Provide information about the risks of potential spillage of chemical products and/or hydrocarbons into the ground;
- Introduce the correct way of storing hazardous and non-hazardous waste;
- Promote the recovery of the waste to be expected at the worker's camp.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

The EPC shall create or appoint a technical team responsible for the management of construction waste and other expected waste. Furthermore, the team responsible for the application and implementation of the WMP must commit themselves to follow the principles listed in **Table 4**.

Table 4: Description of duties of the WMP Officer.

EPC: Duties and Functions
<ul style="list-style-type: none"> • Be aware of and enforce legislation on the collection, transportation, treatment, recovery and final disposal of all waste produced on site (Presidential Decree No. 190/12 of 24th August and Executive Decree No. 17/13 of 22th February).
<ul style="list-style-type: none"> • Be responsible for the final disposal of the waste produced on site and assist other employees, as to the organization in general in respecting a correct segregation and conditioning of waste. This includes providing Environmental, Health and Safety training.
<ul style="list-style-type: none"> • Prepare training programmes or courses on Environment, Health and Safety for the Project staff and service providers with the aim of raising awareness on the implementation of the principles of reducing, reusing and recycling waste in all activities on the site.
<ul style="list-style-type: none"> • Provide medical tests for all workers hired on the Project to ensure that they do not have health problems that could affect their productivity and ability to ensure their own safety and that of those around them.
<ul style="list-style-type: none"> • Develop a leaflet explaining the Environmental, Health and Safety Policies defined by both ENDE and the EPC and fix it in the safety showcase for the attention of all Project's workers, service providers and potential visitors.
<ul style="list-style-type: none"> • Keep records (photos, videos, attendance and verification lists) for better monitoring of the WMP procedures.
<ul style="list-style-type: none"> • Propose and carry out preventive and corrective actions relating to environmental non-conformities that may arise as a result of operational constraints in the waste management stages.

The responsibilities for the institutions of the Angolan Government and others in the WMP are shown in **Table 5**.

Table 5: Responsibilities of the institutions engaged in the WMP.

Responsibilities	Tasks
ENDE	<ul style="list-style-type: none"> • Supervise all waste management operations carried out by EPC and its subcontractors.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Responsibilities	Tasks
	<ul style="list-style-type: none"> • Ensure that EPC complies with the environmental legislation in force on waste management Plan. • Ensure the issuing of the technical and certified opinion by the National Waste Agency on the WMP. • To guarantee an agreement with the governments of Huíla province to indicate environmentally correct locations for the disposal of construction waste, hazardous waste and other waste.
<p>Waste producer responsibility (EPC)</p>	<ul style="list-style-type: none"> • Identify, quantify and segregate all the waste generated. • To have a system for collecting, handling and storing waste so as to minimise the risk of accidents and environmental contamination; • Contract only waste collection operators that are previously licensed by the ANR and/or authorised by the Provincial Government of Huíla; • Provide appropriate personal protective equipment to all employees involved in waste management; • Obtain the ANR's opinion and approval for this Waste Management Plan; • Present to the ANR the annual report on the waste collected and transported on site; • Keep control of the treatment and destination of the waste with the receiver.
<p>Receiver's Responsibility (Waste Collection Company)</p>	<ul style="list-style-type: none"> • Guarantee compliance with the legal requirements applicable to their activity; • Remove and transport the waste produced at the site in appropriate tipper vehicles; • Only treat and dispose of waste approved by the environmental bodies (ANR, Huíla Provincial Government); • Report any accident or incident occurred during the transportation of the waste, for example, overflow onto public roads;

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Responsibilities	Tasks
	<ul style="list-style-type: none"> • Issue the cargo manifest associated with the transportation, disposal and final destination of the hazardous waste.
National Waste Agency (ANR) Responsibility	<ul style="list-style-type: none"> • Provide guidance to companies and the general public on the application of environmental protection norms and standards; • Approve instructions, standards, guidelines and other acts necessary for the implementation of the waste management system; • Ensure that all waste produced is identified, characterised and classified according to the standards in force; • Ensure that waste is collected, handled and stored properly in order to minimise the risk of environmental accidents; • Ensure that waste is treated, recovered or disposed of in an environmentally correct manner.

1.6.3 WASTE MANAGEMENT COMPANIES

Only waste management companies certified by national authorities (Agência Nacional de Resíduos and local government) and able to meet the appropriate EPC and ENDE standards and requirements will be contracted for the transportation and disposal of any and all waste streams. Treatment and disposal sites will be audited to ensure compliance with appropriate standards prior to approval, whenever this situation occurs. Contracted waste management companies will be audited to ensure that all local environmental policies, procedures, regulations, treatment and disposal systems are being followed and enforced. Whenever waste management companies are contracted, they shall:

- Submit to EPC and ENDE a Monthly Waste Report; and
- Provide EPC with documentation and manifest that confirms the reception of the waste, the quantities involved and the type of treatment and destination.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

1.7 EMERGENCY RESPONSE PLAN

Project related environmental incidents shall be dealt with in accordance with an emergency response plan. All emergencies shall be dealt with in accordance with the defined Plan. The Emergency Response Team shall provide immediate response to any significant incident. Examples of general incidents that may occur and the emergency responses that may be required and result in the generation of waste are as follows:

- **Fire outbreak** – in the Project area, in a vehicle, or in surrounding vegetation. The Project area emergency team will take immediate action appropriate to the nature and extent of the fire, and alert the local authority as appropriate; and
- **Hydrocarbon spills** (oils, fuels, lubricants, hydraulic fluids) – any hydrocarbon pool shall be covered with a suitable commercial absorbent material. The absorbent material and soil will be removed for bioremediation.

1.8 ENDE AND EPC EHS POLICY

ENDE is a company committed to environmental, health and safety issues at work and sustainability in general of all the projects that are coordinated on behalf of the State. The health and safety of all personnel working for ENDE is of paramount importance to the company. This is reflected in the company's Environment, Health and Safety (EHS) Policy which states that "employee" includes any consultant or contractor of the company.

No worker on this Project is expected to undertake activities that he/she reasonably considers unsafe. Each worker has the responsibility to work safely and address his/her health and safety concerns as soon as they arise. The EPC will be required to conduct all activities of the Project in an efficient manner, while providing:

- A safe and healthy workplace;
- Information on workplace hazards and training on how to work safely; and
- Consultation with each level of staff on health and safety issues.



Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

The responsibility for health and safety performance, including the training of each employee, rests with the Company's Board of Directors and Management. The identification of potential risks to environment, health and safety requires ongoing assessment by employees, management and the Company's Board of Directors.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

2 PROJECT DESCRIPTION

This chapter explains the facilities and activities planned for the development the 60 kV Distribution Line Project between the 220/60 kV East Lubango and the 60/15 kV Arimba substations in Lubango municipality, including the planning background, project design guidelines and the key elements and activities involved in the planned implementation and operation phases, as well as schedule, cost and expected land take.

2.1 PROJECT LOCATION

The proposed 60 kV DL Project of about 10 km length is located in Lubango municipality, Huíla province as shown in **Annex 6**.

2.2 DESCRIPTION OF THE 60 KV DISTRIBUTION LINE

The 60 kV DL Project should avoid whenever possible to cross:

- Aeronautical or radio service;
- Urban or urban expansion areas and rural residential areas;
- Ecologically and biologically sensitive areas;
- Hospital and school buildings;
- Cultural heritage sites, etc.

Permanent Project components include the electrical infrastructure (substation, controls buildings, transformers, transformer bays, line bays, busbars, reactive power compensation, etc.), the towers that will support the overhead DL, foundations to support the towers, DL markers, and access roads and RoW. The Project design will also include the following elements:

The placement of DL structures will be carried out on the ground defined for each tower, in an area of 7x7 m for the suspension towers and 8x8 m for the tension towers will be mounted and erected on the ground indicated for it. In total, approximately 36 towers will be erected in about 300 meters of distance between each.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

Construction Phase Activities

Include implementation activities for DL, site excavation, concrete base construction to support the towers that will accommodate the DL, including the implementation of tips, transport of tower components and other raw materials, assembly and erection of towers and placement of DL. In summary, this phase will entail the following (not necessarily as per the order below):

- Mobilising workers, machinery and construction equipment;
- Surveying and development of access roads;
- Clearing vegetation and stripping topsoil within the boundaries of the worker's camp, construction sites, RoW and Arimba substation, and for each tower point;
- Setup of worker's camp;
- Transport of all the required materials, equipment and components to the worker's camp and to each tower location;
- Movement and operation of heavy machinery and equipment;
- Management of waste produced;
- Clearing trees from the right-of-way;
- Surveying and pegging of towers locations;
- Earthworks associated with the tower and substations' foundations/platforms;
- Construction of concrete foundations to support Arimba substation and the towers (including installation of stay-cables to the ground and the installation of support bases);
- Assembling and erecting tower using temporary laydown areas at each tower;
- Laying of cables, conductor stringing, line signalling, aerial beacons and bird diverters – entails unrolling, adjusting and securing of the cables, using the areas around, or between, the towers.
- Installation of temporary protective structures where cables cross over or beneath obstacles (namely roads, railways and other aerial lines);
- Conductor and Optical Ground Wire (OPGW) stringing;
- Building and assembling all required equipment and structures inside the Arimba substation area (usually undertaken by highly qualified team), including associated buildings and security fencing;

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

- Commissioning of the Arimba substation, which involves carrying out several tests to ensure that the equipment, and the protection and control systems, are properly installed and functioning correctly before the substation commences operation;
- Installing anti-climbing devices on the towers; and
- Demobilising worker's camp and rehabilitating affected areas, including the following actions:
 - Removal/decommissioning of contractor's camps;
 - Removal and disposal of all construction equipment and rubble;
 - Rehabilitation of all areas disturbed by construction works;
 - Rehabilitation of all access roads not required in the operational phase.

2.3 WORKER'S CAMP

During Project implementation, temporary laydown and worker camp area will be required. They will serve as logistical centres for construction activities along a given length of the line. One (1) worker's camp will be established, in Arimba with 10,000 m² of area. This camp will be constructed for the RNT 220 kV Transmission Line and also used for this project. The worker camp will be restricted to the minimum size that is practically required to facilitate construction and will be preferentially located in already-disturbed (cleared) locations. Selection of the laydown area will be done in consultation with Huíla ENDE and RNT's team. The temporary construction worker's camp and laydown area will be rehabilitated once construction is complete.

2.4 TOWER STRUCTURE OPTIONS

Towers will be selected and installed in accordance with the latest industry standards, and according to ENDE's technical requirements at the time of construction, within the parameters of this assessment. Tower will vary between 24 m and 25 m in height and the distance between each tower will be between 300 m (see **Figure 4**), depending on terrain.

A LL-ACSR/SA728 mm² x 2 conductor is proposed for ENDE. The footprint of each tower foundation will be up to 8 m x 8 m (ranging from 49 to 64 m²) and foundations may be up to a maximum depth of 5 m.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

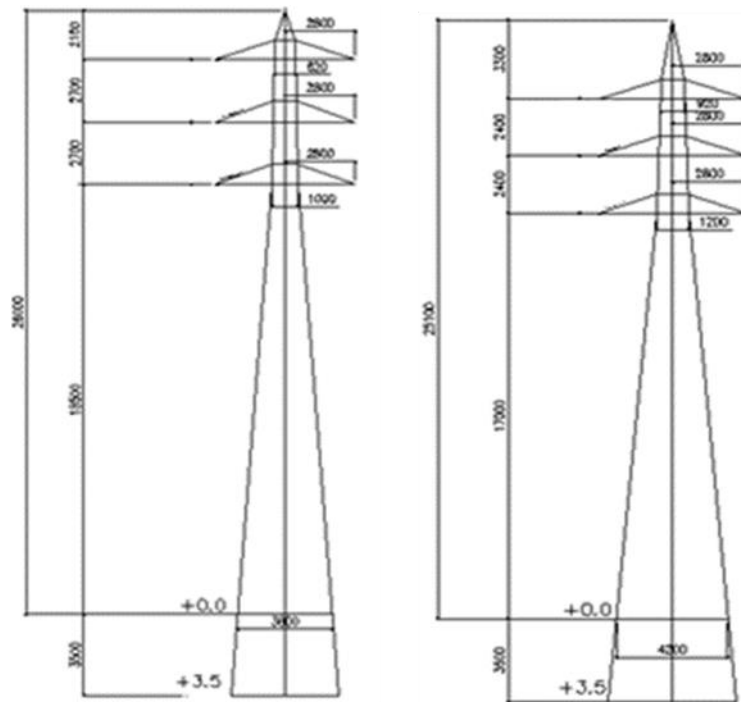


Figure 4: Type of tower structure proposed to use in 60 kV TL Project (suspension and tension).

2.5 ARIMBA SUBSTATION DESCRIPTION

The 60/15 kV Arimba Substation will be implemented on land behind the Arimba Thermal Power Station in an area of approximately 4,324 m² (see Annex 7). **Figure 5** below shows the layout of Arimba substation and additional information on operation and future connections.

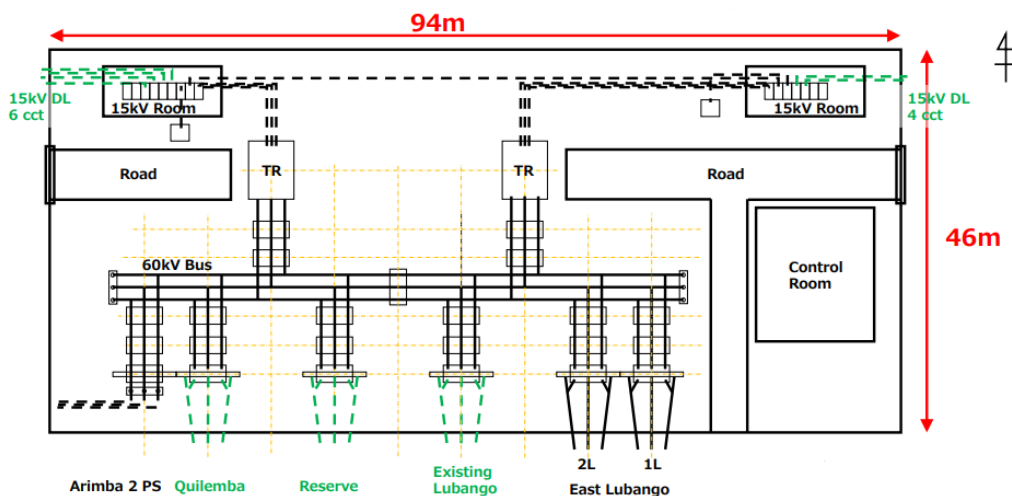


Figure 5: Layout of Arimba substation. **Source:** JICA, 2021.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

2.6 WATER AND ELECTRICITY

During the implementation stage, the Project Manager will require potable water, for the construction workers. Water will also be required for the construction of the foundations for the towers and the substations construction as well as for other any constructions activities. Water will be sourced from contracted water trucks approved by the local authorities and provided as bottled drinking water for the staff. Daily water consumption is expected in the order of 24.13 m³. During the development of the Project, electricity consumption will be ensured by generator group. At least one generator is expected to be installed at each worker's camp. In the future, the Arimba substation will be self-sustaining.

2.7 WORKFORCE AND INVESTMENT BUDGET

A mixture of unskilled temporary employees, semi-skilled and highly-skilled employees will be required for Project implementation. The unskilled labourers are generally trained by the contractors and sourced from local communities. Skilled staff will be accommodated in rented accommodation in nearby communities or accommodated within a temporary worker's camp, depending on the distance to the construction site.

The total number of people in the workforce will be approximately 30 persons for 60 kV DL depending on the availability of the service provider. The installation of the 60 kV DL will be conducted by an international contractor under a contract with ENDE, which will provide the necessary specialized equipment and trained personnel to complete the work. Local workers may be hired to assist in transportation, line cleaning, placement/recovery of receivers, assistance in cleaning and restoring the lines. ENDE staffs may also have direct participation in the Project management (as a company's men).

The estimated total Project capital investment requirement about 1,100,000 USD (one million and one hundred United States Dollars).

2.8 OPERATION AND MAINTENANCE PHASE

The operational phase refers to the operation of the proposed DL (electricity distribution) and associated infrastructure (e.g., 60/15 kV Arimba substation), which will be maintained

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

periodically according to the specifications of the ENDE company. The following activities will be required during the anticipated operational lifespan of 40 years:

- General functioning of the DL (physical presence and functional characteristics);
- Periodic inspections, monitoring, and maintenance of the line, entailing the verification of the state of the conductors and structures (and replacement of components, if damaged), assessment of the compliance of the safety distances between the vegetation and the conductors, and environmental and social monitoring impacts;
- Vegetation management along the servitude e.g. cutting and pruning of trees, selective herbicide application, and bush clearing;
- Management of waste production associated with the periodic maintenance actions (limited to towers footprints and substation interiors); and
- Periodic maintenance activities at the Arimba substation, which include cleaning insulators, checking circuits, testing batteries, replacing transformer oils, etc.

**Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province**

3 APPLICABLE ANGOLAN LAWS AND LEGISLATION

This Waste Management Plan (WMP) was prepared in accordance with environmental legislation in force in the Republic of Angola on waste management. The WMP also follows the recommendations of the National Waste Agency (Agência Nacional de Resíduos - ANR) both in terms of plan content and annexed documents. **Table 6** presents a summary of the main legislation used for the preparation of the plan.

Table 6: Overview of Legislation used to draft the WMP.

Legislation	Overview
Administrative Offences Act (Law No. 12/11 of 16 February)	<ul style="list-style-type: none"> • It establishes the general bases applicable to administrative offences either individually or collectively committed by citizens or public or private legal entities. • In Article 10, the offences against hygiene and public health are listed, namely the deposit of solid waste outside the designated places or times, the dumping, storage or heaping of waste, wastewater, polluting substances or other waste of the same or similar nature in the public highway, rivers, territorial waters, indoor gardens and other inappropriate places, among others. • Individuals or corporate bodies who, by action or omission, commit administrative offences shall be subject to the payment of administrative fines (Article 11).
Regulation on Waste Management (Presidential Decree No. 190/12 of 24 August)	<ul style="list-style-type: none"> • All public or private entities that produce waste or carry out activities related to waste management must prepare a WMP (article 7). • The WMP is valid for a period of four (4) years, starting from the approval date (article 7, point 3). • At the time of collection, a manifest must be filled out in accordance with the model in Annex II of this decree, mentioning the quantities, quality and destination of the waste, and a copy of the manifest must be sent to the Ministry of the Environment, one of which must be kept by the company and the others, with the carrier and the recipient of the waste, respectively, for a period of five (5) years (article 19).
Strategic Plan for the Management of Urban Waste	<ul style="list-style-type: none"> • PESGRU is a national reference instrument for the management of urban waste, which establishes a new approach for the management of waste in Angola.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Legislation	Overview
<p align="center">(Presidential Decree No. 196/12 of 30 August)</p>	
<p>Waste Management from Construction and Demolition (Executive Decree No. 17/13 of 22 February)</p>	<ul style="list-style-type: none"> • This executive-decree sets out the legal regime for waste management originated from building or demolition works or landslides (CDW), which includes the prevention and re-utilisation and collection, transportation, storage, sorting, treatment, recovery and disposal operations of such waste. • Article 3 states that the management of CDW is the responsibility of all those involved in its life cycle, from the original product to the waste produced, according to the extent of their intervention in it, as set out in the law.
<p>Regulation on Public Water Supply and Water Disposal Sanitation (Presidential Decree No. 83/14 of 22 April)</p>	<ul style="list-style-type: none"> • The wastewater containing grease is drained into grease traps, sized and identified in accordance with number 1 of article 42 of this Decree. • The managing entities are forbidden to receive wastewater from kitchens and tanks discharged directly into their sewer systems without passing through a grease trap.
<p>National Waste Agency (Presidential Decree No. 181/14 of 28 July)</p>	<ul style="list-style-type: none"> • This Presidential Decree creates and approves the Statute of the National Waste Agency (ANR) to enforce the waste management policy at a national level within the scope of regulation, standards and supervision. • The WMP must be submitted to the ANR, which will issue its technical opinion and approval after a pre-licensing visit. • To get a technical opinion on the WMP, it is necessary to pay fees that vary from Kz. 5000 to 300 000.00, taking into account the size of the Project area. • The WMP must be updated and submitted to ANR, at least 90 days before the expiration date and whenever there are significant changes to the plan that has been submitted (article 7/4).
<p>Regulation for the Transfer of Waste Destined for Reuse, Recycling and its Valorisation (Presidential Decree No. 265/18 of 15 November)</p>	<ul style="list-style-type: none"> • It establishes the rules and procedures regarding the operational and administrative control over the transfer of waste for reuse, recycling and its valorisation outside the country. This Regulation is applicable only to non-hazardous waste intended for reuse, recycling and valorisation, to be transferred abroad.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

4 WASTE MANAGEMENT

This section presents the models for the management of construction waste and other similar urban waste that will be implemented by EPC hired for the construction of the 60 kV DL and associated infrastructures (with emphasis on the Arimba substation), in order to promote the environmental, social and corporate sustainability of the work.

4.1 WASTE MANAGEMENT STRATEGY

The management of waste from this Project will be integrated, i.e., it will encompass interconnected stages, from non-production efforts to final disposal. This management will focus on waste reduction, treatment and raising the environmental awareness of all employees engaged in the different activities on site. Through compatible activities and guidelines from the EPC, the active participation of employees, as well as potential visitors, will be encouraged. All the waste to be expected at the site (worker's camp and along the distribution line workplaces) will be correctly handled or disposed of in specific containers in worker's camp and removed by companies registered with the National Waste Agency to carry out this activity.

For this plan, the main promoter will be the application of the waste management hierarchy concept, where minimisation and recovery will be achieved through the application of the following chain of action, whenever this is deemed possible or feasible:

- **Rethink** – Rethink consumption habits (avoid excessive production of construction waste, electrical and domestic equipment, etc.).
- **Repair** – Repair malfunctions of towers, energy transport steel cables, machinery and miscellaneous equipment and motorised support vehicles in order to avoid producing waste of different kinds.
- **Reduce** – Reduce unnecessary consumption of raw materials in the construction process.
- **Reuse** – Reuse as much as possible before throwing away.
- **Recycle** – Recycle materials as much as possible.
- **Refuse** – Refuse products which harm the environment and the public health.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

4.2 CLASSIFICATION AND CATEGORIZATION OF WASTE

According to the Regulation on Waste Management (Presidential Decree No. 190/12 of 24th August, Article 4), the foreseeable waste from the construction of the distribution line and associated infrastructure are classified into two (2) categories for easier identification and segregation, namely: **non-hazardous waste** and **hazardous waste**. Regarding categorisation, the foreseeable waste is included in the Angolan Waste List (LAR), as illustrated in **Table 7**.

Table 7: Type of waste and LAR code.

TYPE OF WASTE	LAR CODE
8. Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks	
Wastes from paint or varnish removal	08011/17
Waste printing toner containing hazardous substances	080317
13. Oil wastes and wastes of liquid fuels (except edible oils)	
Oils used in the generators on site	1302
Oil-containing water from separators, chutes or from the cleaning after a one-off spill	130507
Wastes of liquid fuel	130701
15. Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified	
Paper and cardboard packaging	150101
Plastic packaging	150102
Wooden packaging	150103
Metal packaging	150104
Composite packaging	150105
Mixed packaging	150106
Glass packaging	150107
Damaged absorbents, filter materials, wiping cloths and personal protective clothing	1502/150202/03
16. Wastes not otherwise specified in the list	
Used tyres	160103
Oil filters for generators	160107
Ferrous metals	160117

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

TYPE OF WASTE	LAR CODE
Waste electrical and electronic equipment (solar panels)	1602
Gases in pressure containers (including those containing hazardous substances)	160504/05
Packaging of chemical products used in the quality control laboratory	160506
Batteries and accumulators (including lead-acid accumulators)	1606
Separately collected electrolyte from batteries and accumulators	160606
Hydrocarbon-containing waste	160708
17. Construction and Demolition Waste (including excavated soil from contaminated sites)	
Concrete, bricks, tiles and ceramics	1701
Mixtures of, or separate mixtures of concrete, bricks, tiles, ceramics containing hazardous substances	170106
Glass, plastic and wood contaminated with hazardous substances	170204
Metals including copper, aluminium, lead, zinc, tin, iron and steel alloys	1704
Gypsum-based building materials	1708
Mixed construction and demolition waste	170904
18. Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care)	
Plaster, compresses, bandages, disposable clothing, garments used for medical assistance (first aid)	180104
Sharp and piercing objects such as syringes	180201
First Aid Kit medicines with expired date	180108
20. Municipal waste (household waste, waste from commerce, industry and services), including separately collected fractions	
Paper, paperboard, magazines, newspapers and cardboard	200101
Glass (glass hulls, soft drink bottles)	200102

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

TYPE OF WASTE	LAR CODE
Biodegradable kitchen waste (leftover food, vegetables, fruit, greens, cooking oil, etc.)	200108
Fluorescent tubes and other mercury-containing waste	200121
Discarded electrical and electronic equipment	200135
Detergent containers containing hazardous substances	200129
Inert waste	200202
Waste from site cleaning	200303
Septic tank sludge	200304
Waste from septic tank cleaning	200306

Source: Presidential Decree No. 190/12 of 24th August.

4.2.1 NON-HAZARDOUS WASTE

The daily non-hazardous waste to be expected in the line construction activities and in the worker's camp are, among others, the following:

- a) **Construction waste:** remains of inert materials (gravel and sand), remains of concrete or ceramic blocks, remains of masonry, wood, cement bags, remains of mortar, bricks, damaged PVC and various aggregates, mixtures of concrete, plaster, ceramic materials, etc.
- b) **Office waste:** paper, plastics, glass, various packaging materials, newspapers, magazines used, etc.
- c) **Food waste at the canteen:** food waste in general², vegetable leftovers, fruit leftovers or peels, wooden sticks, used paper or napkins, used cooking oil, PET or tetra-pak packaging, shards of glass, aluminium cans, etc.
- d) **Ferrous metal waste:** remains of welded steel mesh, aluminium or stainless steel metals, coated wiring, etc.
- e) **Land clearing waste:** trees, bushes, grasses and pruning material removed from the construction sites (distribution line route) and support areas (worker's camp).

² Meals are not allowed at the construction site. All meals will be served in the workers' camp canteen or in places set up for this purpose.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Special solid waste: waste with specific characteristics and that needs to be collected and treated or disposed of in a specific way, namely: used first-aid kit medicine packaging, used tyres from motor vehicles, electrical and electronic waste, batteries, used toner, the remains of copper steel cables from electricity distribution lines, etc.

4.2.2 HAZARDOUS WASTE

Hazardous waste is waste or any combination of waste that presents a real or potential hazard to human health or to other living organisms, in addition to causing damage to the environment. Examples are those with characteristics such as flammability, corrosively, reactivity, toxicity or pathogenicity. Thus, the potential hazardous waste expected at the worker's camp are, among others, the following:

- a) Waste fluids or lubricating oils (used oils in generators and vehicles);
- b) Transformers damaged accidentally (as they contain hazardous substances);
- c) Oil filters and spark plugs of generators and motor vehicles;
- d) Containers with concentrations of chemicals (e.g., sulphuric acid solutions and other corrosive, toxic, flammable or environmentally harmful products);
- e) Used electronic waste (batteries, toner used in the office, electricity transmission cables containing harmful substances, etc.);
- f) Used batteries;
- g) Damaged mercury vapour fluorescent lamps;
- h) Waste packaging from detergents, degreasers, disinfectants, etc.;
- i) First aid kit or site infirmary drugs with expired date;
- j) Damaged plastic bins of health service waste;
- k) Drums or plastic drums used for storage of used hydrocarbons;
- l) Sanitary waste (black water from chemical washrooms, used toilet paper and towels);
- m) Gases in pressure containers containing hazardous substances, among others.

In order to better characterise and define the hazardous waste expected at the worker's camp, the characteristics that these may present are described below, as set out in **Annex III** of Presidential Decree No. 190/12 of 24th August (see **Table 8**).

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Table 8: List of hazardous waste characteristics.

CHARACTERISTICS
<p>Flammable Liquid:</p> <p>These are liquids, mixtures of liquids or liquids containing solids in solution or suspension (e.g. paints, varnishes, lacquers, etc., not including substances or wastes otherwise classified because of their hazardous characteristics) that may release flammable vapours at temperatures not exceeding 60.5 °C for open bottle testing or not exceeding 65.6 °C for closed bottle testing. Since the results of open and closed bottle tests are not strictly comparable, and since results obtained by the same method often vary, regulations deviating from the above values in order to take account of such differences are deemed to be compatible within the spirit of this definition.</p>
<p>Spontaneously flammable substances or waste:</p> <p>Substances or wastes which may spontaneously heat up under normal conditions of transport, or heat up in contact with air and thereby become flammable.</p>
<p>Corrosives:</p> <p>Substances or wastes which, through chemical action, may cause serious injury when in contact with living tissue or which, if spilled, may seriously damage or destroy other substances or their means of transport, or may create other hazards.</p>
<p>Substances releasing flammable gases in contact with water:</p> <p>Substances or wastes which may spontaneously ignite or emit flammable gases in dangerous quantities when reacting with water.</p>
<p>Toxic substances (with delayed effects):</p> <p>Substances or wastes which, if they are inhaled or ingested or if they enter the skin, may produce delayed or chronic effects, including carcinogenic effects.</p>
<p>Ecotoxic substances:</p> <p>Substances or wastes which present or may present immediate or delayed risks to the environment by bioaccumulation and/or toxic effects on biotic systems. Substances which after disposal may in some way give rise to other substances, such as a leaching product, which have any of the above characteristics.</p>
<p>Infectious substances:</p> <p>Substances or wastes containing living micro-organisms or their toxins which are known or reliably believed to cause disease in humans or animals.</p> <p>Substances which after disposal may in some way give rise to other substances, such as a leaching product, which have any of the above characteristics.</p>

Source: Presidential Decree No. 190/12 of 24th August.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Wastes associated with SARS-Cov-2

All the waste produced associated with SARS-Cov-2 (COVID-19), namely masks, gloves, other materials/equipment and, among other disposable PPE, should be considered as Infectious Substances (as shown in **Table 8**, in accordance with the Presidential Decree No. 190/12 of 24th August). These wastes, treated as health service waste, should receive special attention regarding their disposal, segregation, packaging and transport, so that the risk of spreading the virus is as low as possible.

Some procedures and precautions that should be put into practice so that the risks associated with this waste are minimised are listed and described below:

1. Use containers similar to those shown in **Figure 9** or containers with lids and which are operated using the feet;
2. If the container is not disposable, the waste should be placed in a first resistant plastic bag, when this is full (maximum filling up to 2/3 (two thirds) of its capacity), it should be well closed, and deposited in a second bag;
3. The containers should be properly identified, using the colour system shown in **Figure 13** and marked with the Hazardous Waste of Infectious Substances symbol (see **Table 9**);
4. Waste should be kept separated and sent to a licensed operator for the management of biohazardous hospital waste (as indicated in **Table 10**).

It is also important to work closely with all employees and site visitors to reduce the risks associated with the spread of the virus. Some aspects to be taken into account during the implementation of the 60 kV DL Project are listed below:

1. All formal and informal workers should be trained on the risks and hazards associated with exposure to the virus, as well as on appropriate workplace protocols to prevent/reduce the chance of exposure and infection. The training session may include, for example, drills.
2. Basic hygiene measures, such as regular hand washing, need to be promoted as well as the means to do so. A regular health check-up system (e.g., daily body temperature check) should also be established for all workers.
3. Strategies to reduce human interaction and ensure distance between workers, where possible, and shifts should be implemented.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

4. Safe working practices, PPE, such as puncture resistant gloves, face and eye protection, should be provided, as well as training on their proper removal and disposal or maintenance.

4.3 INTERNAL CONDITIONING AND IDENTIFICATION OF WASTE

All the civil construction waste to be expected at the construction site and worker's camp, with exception for the vegetation removed, shall be correctly segregated at source by the employees (foremen, bricklayers, assistants and others) and subsequently stored in metallic skips made of resistant steel sheets, which shall be positioned in strategic locations (a place exclusively for storing waste, with a cover to protect it from sunlight, sealed and marked according to the nature and hazardousness of the waste) and previously signposted. The metallic skips may have a volume of 4 or 5 m³ of storage capacity, including manual opening lids of complete steel or plastic, in order to avoid the dissemination of unpleasant smells on site or the attraction of insects and other animals (see **Figure 6**).

The construction waste shall be segregated and stored according to the physical and chemical characteristics, the hazards involved, the ease of collection and the possibility of recovery or reuse in other activities on site.



Figure 6: Example of a metallic skip.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Preference will be given to good site organization, some construction waste (steel, aluminium or stainless steel metals, wire mesh, different PVC, plastic paint cans, leftover copper cables, towers, steel cables, and metal parts or structures from the support towers of the lines that have not been used for whatever reason, etc.) will be stored in tooling containers made of heavy-duty steel sheet, including a steel manual-opening door (see **Figure 7**). The tooling container will have a safety showcase with the list of all stored materials and the handling techniques in case of need, the stock control forms, including the Chemical Safety Data Sheets duly kept to warn about the different ways of using them.



Figure 7: Tooling container to be used for metal storage.

The waste from removal or pruning of vegetation (in the case of small and medium-sized herbaceous species and shrubs) will also be stored in metallic skips (see **Figure 6**). The large plant species will be removed and immediately placed in single or double poly crane vehicles for their transport at the place previously agreed with the Provincial Office of Environment, Waste Management and Community Services in Huíla.

The non-hazardous waste considered as urban waste, particularly office and canteen waste, etc., to be expected on site shall be stored in suitable conventional plastic containers. The conventional plastic containers shall have a storage capacity of 360 and 1000 litres, made of washable material, resistant to puncture, rupture and leakage with a lid equipped with a manual opening system, as

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

shown in **Figure 8**. The waste will initially be stored in polyethylene bags (white or black) and later placed in containers scattered around the site and in the worker's camp.



Figure 8: Types of plastic containers to be placed on the construction site.

The idea of first storing small quantities of solid waste in polyethylene bags, with various capacities and resistance to support the contents, is to guarantee that they do not contaminate the conventional containers, to facilitate their transport by the indicated team and others, to prevent the spread of unpleasant odours on site or the presence of rodents, etc.

Regarding hazardous waste (see **Section 4.2.2**), used lubricating oils shall be stored in appropriate polyethylene plastic drums or jerrycans with a capacity of 1,000 litres (see **Figure 9**) over a movable retention basin in a sealed space, protected against the solar rays and used exclusively for such purpose. In the same space, plastic containers for used chemical substances (paint cans, used oil drums), containers for used batteries (see **Figure 9**), containers for filters and spark plugs used in the generators will also be stored, with each container being stored on pallets.

Other hazardous waste, such as damaged fluorescent light bulbs, toners, used batteries, among others, will also be segregated and stored in appropriate locations (protected from the sun's rays and weather conditions) and containers (of resistant and waterproof material) (see examples in **Figure 9**).

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province



Figure 9: Polyethylene container to store used oil (left) and used batteries or other hazardous waste (right).

Medicines with an expired date or expendable material from the infirmary (used gloves and masks, gauzes, cotton, dressing leftovers, among other hospital waste), although expected in very small quantities, will be stored in appropriate containers (see **Figure 9**), of varying capacities and resistance and labelled with the name of the waste and the international symbol for hazardous substances. The sharps waste produced in the site infirmary (syringes and needles) will be kept in Descarpack cardboard boxes (see **Figure 10**). Stainless steel ashtrays will also be available in the worker's camp and construction areas for the disposal of cigarette butts, i.e. in the designated and signposted smoking area (e.g., smoking is allowed in this area).



Figure 10: Types of receptacles to store health care waste and used batteries.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

The health care waste to be collected from the chemical washrooms and toilets at the construction site and worker's camp, such as: used toilet paper, paper towels, hand wash gel containers, toilet brush and dirty rags will be stored in smaller 25 litre containers.



Figure 11: Types of containers for storing health care waste.

Given that on the construction front and in the worker's camp there will be generators of various energy outputs and fuel storage tanks, a spill clean-up kit and sand buckets will be installed and is expected to remain throughout the life of the Project for cleaning the facilities in case of occasional hydrocarbon spills during preventive overhauls of the generators and support machinery or any residual effluent (see **Figure 12**).



Figure 12: Spill clean-up kits to be installed on site.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province


In general, all expected waste at the worker's camp, with the exception of waste from cleaning the septic tanks (black water sludge and soapy water), shall be stored in polyethylene plastic containers or bins and metal buckets with the international hazardous waste label or symbol (see **Table 9**). The Site Management will label the plastic and metallic containers with the name and type of waste to be deposited in each one of them (example illustrated in **Figure 13**). The burning of waste in worker's camp and along the construction areas will be expressly forbidden.








Figure 13: Colour code to be used in the waste identification.

The containers with the labels illustrated in **Figure 13** will be placed in strategic locations (a place exclusively for storing waste, with a cover to protect it from sunlight, sealed and marked according to the nature and hazardousness of the waste) at the construction front and in the worker's camp, in order to raise the employees' awareness as to the correct segregation of post-consumption waste. The label to be placed in the storage containers for hazardous waste shall always comply with the rule presented in **Table 9**.


Table 9: Hazardous waste identification.

TYPE OF WASTE	METHOD OF IDENTIFICATION	LABEL TYPE
Flammable liquids	The containers must be identified by a black label with a red background, placed on both sides as an international symbol for substances made up of flammable liquids.	

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

TYPE OF WASTE	METHOD OF IDENTIFICATION	LABEL TYPE
Flammable Solids	The containers must be clearly identified by a black label with a red and white striped background, placed on both sides as an international symbol for substances made up of flammable solids.	
Corrosive Substances	Containers of hazardous waste consisting of corrosive substances (acids, bases) must be clearly identified by a label on both sides with the international symbol for corrosive substances.	
Hazardous Waste Containing Toxic Substances (Acute)	Hazardous waste containers of Toxic Substances must be clearly identified by a black label with a white background, placed on both sides as the International Symbol for toxic substances (acute).	
Ecotoxic Substances	The containers should be clearly identified by a label with a white background, black tree and white fish, placed on both sides as an international symbol for ecotoxic substances.	
Hazardous Waste Comprising substances that in contact with water Emit flammable gases	The containers for hazardous waste consisting of substances which, in contact with water, release inflammable gases, shall be clearly identified by a black label with a blue background, placed on both sides as an international symbol for substances which, in contact with	

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

TYPE OF WASTE	METHOD OF IDENTIFICATION	LABEL TYPE
	water, release inflammable gases.	
Hazardous Waste Containing Infectious Substances	The hazardous waste containers of infectious substances (including infected objects) shall be clearly identified by a black label with a white background on both sides as the international symbol for infectious substances.	

Source: Presidential Decree No. 190/12 of 24th August.

4.4 WASTE COLLECTION AND TRANSPORTATION

The waste to be expected at the construction site, worker's camp, including vegetation that has been removed along the RoW to improve visibility of the work area, will be collected by employees using wheelbarrows, dumpers, bobcat (see **Figure 14**), forklifts or similar vehicles. The waste collected will be subsequently transported to the site.



Figure 14: Dumpers expected to be used for waste collection inside the worker's camp.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

For the external collection and transportation of the waste, a basic sanitation company in Huíla province will be contracted, provided it is registered with the National Waste Agency and/or authorised by the Huíla Provincial Government for the collection and transportation of waste. It must use dumper vehicles of 16 m³ capacity, equipped with container lifting system and plate compacting equipment (see example in **Figure 15**).



Figure 15: Dump truck for waste collection.

Only hazardous waste (discussed in **Section 4.2.2**) collected and/or transported by the contracted sanitation company will be subject to the completion of a Waste Cargo Manifest (see the **Manifest Template in Annex 2**).

The loading and unloading of the waste transportation compactor tipper vehicles will be the entire responsibility of the EPC and ENDE (**Project Promoter**), based on the completion of the Annual Management Report form (see **Annex 1**), which will later send a copy of the hazardous waste cargo manifest to the National Waste Agency and a copy will be kept at the office for approximately five (5) years.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

4.5 WASTE RECOVERY

The EPC and ENDE are committed to implementing good practices in construction waste management, so that it can give priority to reuse, recycling and recovery of construction waste, when possible. Whenever possible, construction waste will be reused in worker's camp or sent to recycling companies in the municipalities along the distribution line route that are duly licensed by the National Waste Agency (ANR). Office waste (paper, printer toner, damaged computers, etc.) and workshop waste (batteries, used lubricating oils, used tyres, vehicle parts, scrap metal, etc.) may be delivered to recycling companies in Huíla province (Lubango city) and nearby, if available, and provided that they accept to receive them under the terms of responsibility presented to them at the time of delivery.

The waste from the construction process that has great potential for internal recovery, such as copper cables and/or parts, ferrous metals, pipe chips, sand and mortar remains, used oil drums, etc., will be stored at strategic locations in the worker's camp for future reuse or recycling. The waste from concrete mixtures, mortar and others can be crushed on a conveyor belt and from that can be reused on site as secondary raw material. This raw material can also be used to manufacture products for the construction site such as bricks, cement blocks, paving, among others. This initiative aims to:

- Guarantee a more effective and sustainable management of the expected waste;
- Guarantee a financial return for the company through the commercialization of recyclable waste or waste that can be recovered in the regional construction market;
- Improve the company's reputation in society (green marketing);
- Comply with the company's environmental policy;
- Implement the Clean Production Principle in the organisation.

Topics such as on-site electricity consumption, water, paper, quality of life at work, among others, will be addressed monthly, in order to stimulate reflection on environmental responsibility and change of attitude in the work environment. In order to reduce paper and toner expenses, the printers in the office will be configured in the standard double-sided, economy quality printing (draft or black and white). Poor quality printed papers will be reused for notepads.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

4.6 FINAL WASTE DISPOSAL

Huíla province do not yet have its own landfill for solid construction and urban waste, which are currently under planning/construction.

Daily produced waste in the Lubango municipality are deposited in open air landfills. In the landfill, the waste is deposited directly on the ground, without any coverage and without control of the percolated liquids produced (slurry) and is generally burnt by the populations and others. This disposal model has great potential for polluting the soil, the air quality and the quality of surface and underground water and affecting the quality of life of the population, who survive on food and other spoiled products that are thrown away.

Therefore, for the final disposal of the construction waste, EPC will consult the ANR (at the time of the pre-inspection visit in Lubango of the WMP) and the Provincial Office of Environment, Waste Management and Community Services (GPARSEC) at the level of the Huíla province. The latter will indicate the places deemed adequate and/or environmentally correct for the disposal of the construction waste and the urban equivalent waste. The sanitation company that will be contracted to collect and transport the waste may also help to identify this location.

On the other hand, if justified, the EPC will establish a protocol with one of the hospitals in Huíla province so that the biomedical waste (including masks worn due to the prevention of transmission of COVID-19) produced in the infirmary can be incinerated there. ENDE will be responsible for verifying compliance with this recommendation and ensure that such aspects are included in the contractual arrangements with the EPC. In terms of hazardous waste, ENDE will ensure that it will be handled by licensed services providers. In case no adequate and licensed landfills sites are available and functional in Huíla Province, the EPC will be required to contract such services in the nearby Provinces (Benguela) or in Luanda.

4.7 TYPES OF EXPECTABLE WASTE

Table 10 presents an overview of the main waste types expected in the construction of the 220 kV distribution line Project and associated infrastructure, including the storage, recovery or treatment forms and final disposal. This table does not present the quantities as at this stage of the Project design these values are not yet defined.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Table 10: Types of waste produced and expected in the Project.

Types of waste	Storage / colour identification	Recovery and disposal method
Non-hazardous Waste		
Expectable construction waste (concrete waste or mixtures, aggregate and crushed stone waste, bricks, vegetable trimmings, wood, ceramic materials, cement bags, ferrous metals, etc.)	Metallic Skip	Reuse in the worker's camp. Available landfills or waste dumps (by indication of ANR and GPARSEC in Huíla).
PVC plastics, plastic films, HDPE blanket remains.	Metallic Skip	Reuse in the worker's camp. Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Ferrous metals (wire, welded steel mesh, steel, aluminium and stainless-steel materials).	Tooling container	Reuse.
Waste from pruning and trimming of vegetation.	Metallic Skip	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Wood (different types of wood, pallets, etc.).	Metallic Skip	Reuse
Organic waste (food leftovers, vegetables, fruit and fruit leaves, etc.).	360 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Edible oils and grease (from the canteen at the construction site).	1000 litre plastic bin	Recycling Company
Office waste (newspapers, paper, cardboard, paper towels, napkins, magazines, boxes, used paper towels, etc.).	360 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Several boxes, used tetra pak packages, PET packages and several bags.	360 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Glass (shards of glass, bottles of drink, food or personal hygiene products).	250 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Common waste (site and office cleaning waste).	250 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Plastics (damaged plastic bins, soft drink containers, cups, buckets, food packaging, PVC and HDPE materials discarded at the site, etc.).	Metallic Skip	Reuse in the worker's camp. Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Residual liquid effluents from the cleaning of chemical toilets on site.	Dump Truck	Certified sanitation company (septic tank cleaning).

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Types of waste	Storage / colour identification	Recovery and disposal method
Cigarette butts.	Stainless Ashtray	Controlled landfill (by indication of ANR and GPARSEC in Huíla).
Hazardous Waste		
Sanitary waste from the chemical toilet (used toilet paper, paper towels, used toilet brush and used gel canisters, etc.).	250 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla or in the closest location/Province).
Containers for used chemical products (reagents, solvents, adjuvants, detergents, disinfectants, additives, etc.).	360 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla or in the closest location/Province).
Waste from the maintenance of generators (used lubricating oils, air filters, oil and diesel filters including spark plugs and batteries used in generators).	Plastic bin	Worker's camp (Recycling).
Glasses (burnt-out fluorescent lamps).	Plastic bin	Controlled landfill (by indication of ANR and GPARSEC in Huíla or in the closest location/Province).
Used-oil contaminated rags from maintenance of back-up generators.	Metallic Skip	Worker's camp Reuse (washing).
Paint and thinner containers.	Plastic bin	Worker's camp (reuse).
PPE waste (work clothes or uniforms, goggles, gloves, masks torn or contaminated in contact with chemical products, etc.).	360 litre container	Controlled landfill (by indication of ANR and GPARSEC in Huíla or in the closest location/Province).
Medicines with expired date (from the first-aid kit or from the infirmary on the worker's camp)	Descarpack	Hospital Unit (Incineration).
Health service waste (Used needles, syringes, gauzes, latex gloves, cotton swabs, gloves, masks, laboratory reagent vials used on site or infected during rescue work).	Descarpack Biological waste collectors	Hospital Unit (Incineration).
Special Waste		
Electronic waste (used batteries, damaged printers, used cartridges, damaged computers, etc.	360 litre container	Worker's camp (repair).
Batteries, oil filters, brake fluids and other components having used PCBs.	Appropriate receptacles	Recycling Companies

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Types of waste	Storage / colour identification	Recovery and disposal method
Used tyres.	Specific area	Worker's camp (Reused).
Expired containers or portable fire extinguishers.	Specific area within the yard	Reuse
Pressure gas receptacles containing hazardous substances used on site	Specific area within the yard	Reuse
Copper cables from lines and tower structures not used for other reasons.	Tool storage container	Reuse
Electrical waste (burnt-out light bulbs, short-circuited switchboards, etc.). ³	360 litre container	Available landfills/dump sites (by indication of ANR and GPARSEC).

5 WASTEWATER & EFFLUENT MANAGEMENT

There will be no remarkable residual liquid effluents produced during the construction work. The chemical toilets (if any) at the construction site will be equipped to receive and store effluents (black and grey water) and will be emptied in accordance with current legislation. On the worker's camp, sanitary effluents will be sent to a biological septic tank. Used lubricating oils from the maintenance of motor vehicles, machinery and generators will be stored in plastic containers with the used oil label, including the collection date (see example in **Figure 9**).

6 AIR EMISSIONS MANAGEMENT

With regard to atmospheric pollution, no significant volumes of gas emissions into the atmosphere are expected due to the nature of the Project, except for the dissemination of dust particles during the earth moving work and occasional combustion gases due to the use of generators on site and the circulation of motor vehicles and machinery. The equipment (generators, machinery and motor vehicles) will be subject to regular maintenance, according to the number of work hours. Measures will be taken to promote the efficient use of electricity, and the following good practices will be adopted:

³ The Project is at an early stage. More detailed daily or monthly waste estimates will be available during the construction phase. The planned annual reports to be submitted to the National Waste Agency will include estimates of waste produced in the Project.

Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

- Ensure periodic maintenance of facilities and equipment;
- Give priority to the use of natural lighting during the day and ensure that all equipment that is not needed is switched off at the end of the working day.

7 OCCUPATIONAL HEALTH AND SAFETY

ENDE has as vital and basic values the safety and health of all its employees, including the safety of the infrastructures under its Projects. In compliance with the Environment, Health and Safety Policy of the company, several Occupational Health and Safety equipment will be installed on worker's camp (compulsory use of PPE, work accident risk signs and road signs with speed limits and passing rights). EPC will be obliged to comply with all safety standards established by ENDE and to implement improvements, where deemed necessary. Weekly inductions will be carried out, according to the function to be performed, regarding environment, health and safety and quality management to ensure the sustainable performance of the work.

EPC will provide adequate medical facilities (infirmary) on the worker's camp, in order to guarantee medical assistance and medication in case of accident or eventual need. Employees involved in waste management will be adequately trained and will perform the sorting and collection of waste in a safe manner, with the compulsory use of Personal Protective Equipment (PPE). On site the PPE to be made available to employees include:

- Company uniform, with long trousers and shirt with resistant fabric sleeves;
- Gloves (leather or chemically resistant);
- Safety glasses, goggles or face shield and helmet;
- Rubber boots with steel toecap;
- Reflective vest;
- Semi-facial respirator and waterproof mask;
- Equipment and utensils that prevent electrocutions;
- Other appropriate work clothing.

*Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province*

8 CONTINUOUS IMPROVEMENT, MONITORING AND REPORTING

The EPC will periodically carry out internal waste management audits and occasional evaluations to monitor compliance with the WMP guidelines. These evaluations will make it possible to have information about possible deviations. If necessary, corrective and preventive actions will be established and included in the WMP. In order to measure the environmental performance, reporting criteria are established so that information is collected at the operations level and analysed through an incident reporting, inspection and audit process. EPC will issue a Waste Manifest (see **Annex 2**) for the shipment of waste from source, and copies will be kept by the EHS department. The Waste Manifest may be divided into three (3) parts:

- **Part 1** is filled out by the waste producer;
- **Part 2** is filled out by the waste carrier; and
- **Part 3** is filled in by the waste receiver.

EPC will monitor, control and keep up-to-date records of waste generated, including copies of the delivery certificates provided by the subcontracted waste management company responsible for disposal or transportation, describing the origin, quantity and type of waste, if applicable.

Article 9 (g) states that a thorough record shall be kept on an annual basis containing the origin, quantities and types of waste handled, transported, treated, recovered or disposed of and retained for five (5) years. A Waste Tracking Log will be kept at the EPC offices. Article 11 (2) states that all entities with responsibility for waste management shall immediately inform the MCTA of any cases of accidental waste spills, through their competent bodies.

LIST OF ANNEXES

Annex 1 – Annual Management Report Form

Annex 2 – Cargo Manifest Form

Annex 3 – Holísticos Certification

Annex 4 – ENDE E.P. Official Gazette

Annex 5 – Tax Identification Number

Annex 6 – Location map of the 60 kV DL Project

Annex 7 – Location map of the Arimba Substation



Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

ANNEX 1 – ANNUAL MANAGEMENT REPORT FORM

ANNUAL GENERATION OF HAZARDOUS WASTE

Production Information for the year from _____
 Company _____
 Address _____
 City _____ Province _____ Mobile No. _____
 Fax _____ email _____
 Contact Person _____

Type of Waste	Quantity	Feature		Destination	Means of Production (Normal, Accidental or Cleaning) *1
		H ⁴	Y ⁵		

Total produced _____
 Completed by _____
 Date _____/_____/_____
 Sign _____

*** Note:** In event of accidents and spillages, provide attached data on the location and measures taken.

⁴ Explosive or flammable hazardous waste.
⁵ Non-explosive and non-flammable hazardous waste.

**Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in
Lubango, Huíla Province**

ANNEX 2 – CARGO MANIFEST FORM

CONSIGNMENT NOTE FOR THE TRANSPORT AND DEPOSIT OF HAZARDOUS WASTE

Company Name _____
 Address _____
 Mobile No. _____ Fax _____ Email _____
 Waste Name _____ Waste Code _____ H _____ Y _____
 Main Components of Waste _____
 Type of Waste: Solid _____ muds _____ liquid _____
 Type of Containers: Tanks _____ Plastic (25 l) _____ Others _____
 Quantity (KG) _____
 Name and Address of Final Destination _____
 Delivery date _____ / _____ / _____
 Signature _____

Waste Producer	Company Registration No.	
----------------	--------------------------	--

Name _____
 Address _____
 Mobile No. _____ Fax _____ Email _____
 Driver Name _____
 Vehicle Registration No. _____
 Temporary Storage: No _____ Yes _____
 Address of Temporary Storage Location _____
 Date Received _____
 Confirmed Driver's Signature _____



Waste Management Plan for the 60 kV Distribution Line Project Between East Lubango and Arimba Substations in Lubango, Huíla Province

Storage, Treatment, Recovery, Deposition and Facility Operator	Company Registration No.	
---	---------------------------------	--

Company Name _____

Address _____

Mobile No. _____ Fax _____ Email _____

Type of Operation: Storage _____ Grouping _____ Recovery _____ Landfill _____

Safe landfill _____ Physical and Chemical Treatment _____ Incineration _____ Others _____

Quantity Received (KG) _____

Date Received _____ / _____ / _____

Signature _____

APPENDIX 3

LIST OF BIRDS FOR PROJECT

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Pternistis afer</i>	Red-necked Spurfowl	LC	WS	R	M	P
<i>Caprimulgus fossii</i>	Square-tailed Nightjar	LC	WS	M	L	P
<i>Tachymarptis melba</i>	Alpine Swift	LC	WS	M	L	P
<i>Apus apus</i>	Common Swift	LC	WS	R	L	P
<i>Apus bradfieldi</i>	Bradfield's Swift	LC	WS	R	L	P
<i>Apus affinis</i>	Little Swift	LC	WS	R	L	R
<i>Centropus superciliosus</i>	White-browed Coucal	LC	WS	R	L	P
<i>Clamator jacobinus</i>	Jacobin Cuckoo	LC	WS	M	L	P
<i>Chrysococcyx caprius</i>	Diederick Cuckoo	LC	WS	M	L	P
<i>Columba livia</i>	Rock Dove	LC	WS	R	M	R
<i>Streptopelia semitorquata</i>	Red-eyed Dove	LC	WS	R	M	R
<i>Streptopelia capicola</i>	Ring-necked Dove	LC	WS	R	L	P
<i>Spilopelia senegalensis</i>	Laughing Dove	LC	WS	R	L	P
<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	LC	WS	R	L	P
<i>Bubulcus ibis</i>	Western Cattle Egret	LC	WS	R	L	P
<i>Ardea cinerea</i>	Grey Heron	LC	WS	R	M	P
<i>Ardea melanocephala</i>	Black-headed Heron	LC	WS	R	M	P
<i>Scopus umbretta</i>	Hamerkop	LC	WS	R	L	P
<i>Elanus caeruleus</i>	Black-winged Kite	LC	WS	R	L	P
<i>Milvus aegyptius</i>	Yellow-billed Kite	LC	WS	R	M	P
<i>Buteo augur</i>	Augur Buzzard	LC	WS	R	M	P
<i>Tyto alba</i>	Western Barn Owl	LC	WS	R	L	P
<i>Colius castanotus</i>	Red-backed Mousebird	LC	ES	R	L	P
<i>Urocolius indicus</i>	Red-faced Mousebird	LC	WS	R	L	P
<i>Upupa africana</i>	African Hoopoe	LC	WS	R	L	P
<i>Coracias caudatus</i>	Lilac-breasted Roller	LC	WS	R	L	P
<i>Halcyon chelicuti</i>	Striped Kingfisher	LC	WS	R	L	P
<i>Halcyon senegalensis</i>	Woodland Kingfisher	LC	WS	R	L	P
<i>Merops hirundineus</i>	Swallow-tailed Bee-eater	LC	WS	R	L	P
<i>Merops pusillus</i>	Little Bee-eater	LC	WS	M	L	R
<i>Merops superciliosus</i>	Olive Bee-eater	LC	WS	M	L	P
<i>Merops apiaster</i>	European Bee-eater	LC	WS	M	L	P
<i>Lybius torquatus</i>	Black-collared Barbet	LC	WS	R	L	P
<i>Falco rupicolus</i>	Rock Kestrel	LC	WS	R	L	P
<i>Falco biarmicus</i>	Lanner Falcon	LC	WS	R	M	P
<i>Agapornis roseicollis</i>	Rosy-faced Lovebird	LC	NE	R	L	P
<i>Tchagra australis</i>	Brown-crowned Tchagra	LC	WS	R	L	P
<i>Dryoscopus cubla</i>	Black-backed Puffback	LC	WS	R	L	P
<i>Laniarius aethiopicus</i>	Tropical Boubou	LC	WS	R	L	P
<i>Nilaus afer</i>	Brubru	LC	WS	R	L	P
<i>Prionops plumatus</i>	White-crested Helmetshrike	LC	WS	R	L	P
<i>Lanius minor</i>	Lesser Grey Shrike	LC	WS	M	L	P

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Lanius humeralis</i>	Northern Fiscal	LC	WS	R	L	R
<i>Oriolus larvatus</i>	Black-headed Oriole	LC	WS	R	L	P
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	LC	WS	R	L	P
<i>Terpsiphone viridis</i>	African Paradise Flycatcher	LC	WS	M	L	P
<i>Corvus capensis</i>	Cape Crow	LC	WS	R	L	P
<i>Corvus albus</i>	Pied Crow	LC	WS	R	L	R
<i>Mirafra africana</i>	Rufous-naped Lark	LC	WS	R	L	R
<i>Pycnonotus tricolor</i>	Dark-capped Bulbul	LC	WS	R	L	R
<i>Chlorocichla flaviventris</i>	Yellow-bellied Greenbul	LC	WS	R	L	P
<i>Psalidoprocne pristoptera</i>	Black Saw-wing	LC	WS	M	L	P
<i>Pseudhirundo griseopyga</i>	Grey-rumped Swallow	LC	WS	M	L	R
<i>Hirundo rustica</i>	Barn Swallow	LC	WS	M	L	P
<i>Hirundo angolensis</i>	Angola Swallow	LC	WS	R	L	P
<i>Hirundo smithii</i>	Wire-tailed Swallow	LC	WS	R	L	P
<i>Ptyonoprogne fuligula</i>	Rock Martin	LC	WS	R	L	P
<i>Delichon urbicum</i>	Common House Martin	LC	WS	M	L	P
<i>Cecropis abyssinica</i>	Lesser Striped Swallow	LC	WS	M	L	R
<i>Cecropis semirufa</i>	Red-breasted Swallow	LC	WS	M	L	P
<i>Cecropis senegalensis</i>	Mosque Swallow	LC	WS	M	L	P
<i>Sylvietta rufescens</i>	Long-billed Crombec	LC	WS	R	L	P
<i>Phylloscopus trochilus</i>	Willow Warbler	LC	WS	M	L	P
<i>Hippolais icterina</i>	Icterine Warbler	LC	WS	M	L	P
<i>Cisticola chiniana</i>	Rattling Cisticola	LC	WS	R	L	R
<i>Cisticola fulvicapilla</i>	Neddicky	LC	WS	R	L	P
<i>Prinia subflava</i>	Tawny-flanked Prinia	LC	WS	R	L	R
<i>Cameroptera brevicaudata</i>	Grey-backed Cameroptera	LC	WS	R	L	P
<i>Turdoides hartlaubii</i>	Hartlaub's Babbler	LC	WS	R	L	P
<i>Zosterops senegalensis</i>	African Yellow White-eye	LC	WS	R	L	P
<i>Lamprotornis nitens</i>	Cape Starling	LC	WS	R	L	R
<i>Cinnyricinclus leucogaster</i>	Violet-backed Starling	LC	WS	M	L	R
<i>Cossypha heuglini</i>	White-browed Robin-Chat	LC	WS	R	L	P
<i>Erythropygia leucophrys</i>	White-browed Scrub Robin	LC	WS	R	L	P
<i>Saxicola torquatus</i>	African Stonechat	LC	WS	R	L	R
<i>Oenanthe familiaris</i>	Familiar Chat	LC	WS	R	L	P
<i>Myrmecocichla nigra</i>	Sooty Chat	LC	WS	R	L	P
<i>Muscicapa striata</i>	Spotted Flycatcher	LC	WS	M	L	P
<i>Chalcomitra amethystina</i>	Amethyst Sunbird	LC	WS	R	L	P
<i>Chalcomitra senegalensis</i>	Scarlet-chested Sunbird	LC	WS	R	L	P
<i>Cinnyris talatala</i>	White-bellied Sunbird	LC	WS	R	L	P
<i>Cinnyris venustus</i>	Variable Sunbird	LC	WS	R	L	P
<i>Cinnyris cupreus</i>	Copper Sunbird	LC	WS	R	L	P
<i>Passer domesticus</i>	House Sparrow	LC	WS	R	L	R

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

SCIENTIFIC NAME	COMMON NAME	IUCN ¹	ENDEMISM ²	SEASONALITY ³	RISK ⁴	PRESENCE ⁵
<i>Passer diffusus</i>	Southern Grey-headed Sparrow	LC	WS	R	L	R
<i>Ploceus ocularis</i>	Spectacled Weaver	LC	WS	R	L	P
<i>Ploceus xanthops</i>	Holub's Golden Weaver	LC	WS	R	L	P
<i>Ploceus velatus</i>	Southern Masked Weaver	LC	WS	R	L	P
<i>Ploceus cucullatus</i>	Village Weaver	LC	WS	R	L	P
<i>Quelea quelea</i>	Red-billed Quelea	LC	WS	R	L	P
<i>Euplectes orix</i>	Southern Red Bishop	LC	WS	R	L	P
<i>Pytilia melba</i>	Green-winged Pytilia	LC	WS	R	L	P
<i>Lagonosticta senegala</i>	Red-billed Firefinch	LC	WS	R	L	P
<i>Uraeginthus angolensis</i>	Blue Waxbill	LC	WS	R	L	R
<i>Estrilda astrild</i>	Common Waxbill	LC	WS	R	L	P
<i>Lonchura cucullata</i>	Bronze Mannikin	LC	WS	R	L	P
<i>Vidua chalybeata</i>	Village Indigobird	LC	WS	R	L	P
<i>Vidua purpurascens</i>	Purple Indigobird	LC	WS	R	L	P
<i>Vidua macroura</i>	Pin-tailed Whydah	LC	WS	R	L	P
<i>Motacilla capensis</i>	Cape Wagtail	LC	WS	R	L	P
<i>Anthus leucophrys</i>	Plain-backed Pipit	LC	WS	R	L	P
<i>Serinus flavivertex</i>	Yellow-crowned Canary	LC	WS	R	L	P
<i>Emberiza tahapisi</i>	Cinnamon-breasted Bunting	LC	WS	R	L	P

Legend:

1 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

2 (ENDEMISM): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

3 (SEASONALITY): R - Resident; M - Migratory

4 (RISK): H - High; M - Medium; L - Low

5 (PRESENCE): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 4

LIST OF MAMMALS

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Potamogale velox</i>	Giant otter Shrew	LC	WS	U
<i>Canis adustus</i>	Side-striped Jackal	LC	WS	U
<i>Canis mesomelas</i>	Black-backed Jackal	LC	WS	U
<i>Lycaon pictus</i>	African Wild Dog	EN	WS	U
<i>Otocyon megalotis</i>	Bat-eared Fox	LC	WS	U
<i>Vulpes chama</i>	Cape Fox	LC	WS	U
<i>Acinonyx jubatus</i>	Cheetah	VU	WS	U
<i>Caracal caracal</i>	Caracal	LC	WS	U
<i>Felis silvestris</i>	Wild Cat	LC	WS	U
<i>Leptailurus serval</i>	Serval	LC	WS	U
<i>Panthera leo</i>	Lion	VU	WS	U
<i>Panthera pardus</i>	Leopard	VU	WS	U
<i>Atilax paludinosus</i>	Marsh Mongoose	LC	WS	U
<i>Helogale parvula</i>	Common Dwarf Mongoose	LC	WS	U
<i>Herpestes ichneumon</i>	Egyptian Mongoose	LC	WS	U
<i>Herpestes sanguineus</i>	Common Slender Mongoose	LC	WS	P
<i>Ichneumia albicauda</i>	White-tailed Mongoose	LC	WS	U
<i>Paracynictis selousi</i>	Selous's Mongoose	LC	WS	U
<i>Crocuta crocuta</i>	Spotted Hyaena	LC	WS	U
<i>Proteles cristata</i>	Aardwolf	LC	WS	U
<i>Aonyx capensis</i>	African Clawless Otter	NT	WS	U
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	NT	WS	U
<i>Ictonyx striatus</i>	Striped Polecat	LC	WS	U
<i>Mellivora capensis</i>	Honey Badger	LC	WS	U
<i>Poecilogale albinucha</i>	African Striped Weasel	LC	WS	U
<i>Civettictis civetta</i>	African Civet	LC	WS	U
<i>Genetta angolensis</i>	Miombo Genet	LC	WS	U
<i>Genetta genetta</i>	Common Genet	LC	WS	P
<i>Genetta maculata</i>	Large-spotted Genet	LC	WS	U
<i>Aepyceros melampus petersi</i>	Black-faced Impala	VU	WS	U
<i>Connochaetes taurinus</i>	Common Wildebeest	LC	WS	U
<i>Hippotragus equinus</i>	Roan Antelope	LC	WS	U
<i>Kobus ellipsiprymnus defassa</i>	Defassa Waterbuck	NT	WS	U
<i>Kobus leche leche</i>	Red Lechwe	NT	WS	U
<i>Oreotragus oreotragus</i>	Klipspringer	LC	WS	U
<i>Ourebia ourebi</i>	Oribi	LC	WS	U
<i>Philantomba monticola</i>	Blue Duiker	LC	WS	U
<i>Raphicerus campestris</i>	Steenbok	LC	WS	U
<i>Redunca arundinum</i>	Southern Reedbuck	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Sylvicapra grimmia</i>	Common Duiker	LC	WS	U
<i>Syncerus caffer caffer</i>	Cape Buffalo	NT	WS	U
<i>Tragelaphus oryx</i>	Common Eland	LC	WS	U
<i>Tragelaphus scriptus</i>	Bushbuck	LC	WS	U
<i>Tragelaphus spekii</i>	Sitatunga	LC	WS	U
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	WS	U
<i>Giraffa camelopardalis</i>	Giraffe	VU	WS	U
<i>Hippopotamus amphibius</i>	Hippopotamus	VU	WS	U
<i>Phacochoerus africanus</i>	Common Warthog	LC	WS	U
<i>Potamochoerus larvatus</i>	Bushpig	LC	WS	U
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat	LC	WS	U
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC	WS	U
<i>Chaerephon chapini</i>	Pale Free-tailed Bat	LC	WS	U
<i>Chaerephon nigeriae</i>	Nigerian Free-tailed Bat	LC	WS	U
<i>Mops niveiventer</i>	White-bellied Free-tailed Bat	LC	WS	U
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	WS	U
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	LC	WS	U
<i>Eidolon helvum</i>	Straw-coloured Fruit Bat	LC	WS	U
<i>Epomophorus angolensis</i>	Angolan Epauletted Fruit Bat	NT	NE	U
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	LC	WS	U
<i>Rhinolophus eloquens</i>	Eloquent Horseshoe Bat	LC	WS	U
<i>Rhinolophus lobatus</i>	Peters's Horseshoe Bat	LC	NE	U
<i>Glauconycteris variegata</i>	Variiegated Butterfly Bat	LC	WS	U
<i>Neoromicia capensis</i>	Cape Serotine	LC	WS	U
<i>Neoromicia grandidieri</i>	Dobson's Pipistrelle	DD	WS	U
<i>Neoromicia nana</i>	Bamana Bat	LC	WS	U
<i>Neoromicia zuluensis</i>	Zulu Serotine	LC	WS	U
<i>Nycticeinops schlieffeni</i>	Schlieffen's Bat	LC	WS	U
<i>Scotophilus dinganii</i>	Yellow-bellied House Bat	LC	WS	U
<i>Atelerix frontalis</i>	Southern African Hedgehog	LC	WS	U
<i>Heterohyrax brucei bocagei</i>	Bush Hyrax	LC	ES	U
<i>Lepus victoriae</i>	African Savanna Hare	LC	WS	P
<i>Pronolagus randensis</i>	Jameson's Red Rock Hare	LC	WS	U
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	LC	WS	U
<i>Equus quagga burchelli</i>	Plains Zebra	LC	WS	U
<i>Diceros bicornis bicornis</i>	South-western Black Rhino	CR	WS	U
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	VU	WS	U
<i>Cercopithecus mitis mitis</i>	Pluto Monkey	DD	ER	U
<i>Chlorocebus cynosuros</i>	Malbrouck Monkey	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Mamíferos da Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Papio ursinus</i>	Chacma Baboon	LC	WS	U
<i>Galago moholi</i>	Southern Lesser Galago	LC	WS	U
<i>Otolemur crassicaudatus</i>	Garnett's Greater Galago	LC	WS	U
<i>Loxodonta africana</i>	Savanna Elephant	NE	WS	U
<i>Fukomys bocagei</i>	Bocage's Mole Rat	LC	NE	U
<i>Fukomys mechowii</i>	Mechow's Mole Rat	LC	WS	U
<i>Graphiurus kelleni</i>	Kellen's Dormouse	LC	WS	U
<i>Graphiurus rupicola</i>	Stone Dormouse	LC	WS	U
<i>Hystrix africaeustralis</i>	Cape Porcupine	LC	WS	U
<i>Aethomys chrysophilus</i>	Red Rock Rat	LC	WS	U
<i>Dasymys cabrali</i>	Cabral's Marsh Rat	NE	ES	U
<i>Dasymys incommutus</i>	African Marsh Rat	LC	WS	U
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	WS	U
<i>Gerbilliscus paeba</i>	Hairy-footed Gerbil	LC	WS	U
<i>Mastomys natalensis</i>	Natal Multimammate Mouse	LC	WS	P
<i>Micaelamys namaquensis</i>	Namaqua Rock Rat	LC	WS	U
<i>Myomyscus angolensis</i>	Angolan Multimammate Mouse	LC	ES	U
<i>Zelotomys woosnami</i>	Woosnam's Broad-headed Mouse	LC	WS	U
<i>Cricetomys ansorgei</i>	Southern Giant Pouched Rat	LC	WS	P
<i>Dendromus leucostomus</i>	Monard's Gray African Climbing Mouse	DD	ES	U
<i>Dendromus melanotis</i>	Gray African Climbing Mouse	LC	WS	U
<i>Dendromus mystacalis</i>	Chestnut Climbing Mouse	LC	WS	U
<i>Dendromus nyikae</i>	Nyika Climbing Mouse	LC	WS	U
<i>Saccostomus campestris</i>	Southern African Pouched Mouse	LC	WS	U
<i>Steatomys krebsii</i>	Kreb's Fat Mouse	LC	WS	U
<i>Steatomys parvus</i>	Tiny Fat Mouse	LC	WS	U
<i>Pedetes capensis</i>	Spring Hare	LC	WS	U
<i>Funisciurus congicus</i>	Congo Rope Squirrel	LC	WS	P
<i>Crocidura erica</i>	Heather Shrew	DD	ES	U
<i>Crocidura fuscomurina</i>	Bicolored Musk Shrew	LC	WS	U
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	LC	WS	U
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	LC	WS	U
<i>Crocidura nigricans</i>	Blackish White-toothed Shrew	LC	ES	U
<i>Crocidura olivieri</i>	African giant shrew	LC	WS	U
<i>Crocidura parvipes</i>	Small-footed Shrew	LC	WS	U
<i>Orycteropus after</i>	Aardvark	LC	WS	U

Legend:

1 (LVEA): Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

*Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation
and the 60/15 kV Arimba Substation in Lubango, Huíla Province*

3 (**ENDEMISM**): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 (**SEASONALITY**): R - Resident; M - Migratory

5 (**RISK**): H - High; M - Medium; L - Low

6 (**PRESENCE**): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 5

AMPHIBIANS LIST

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de dados das Espécies de Anfíbios da Huíla					60KV DL
Ordem	Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	
Anura	<i>Xenopus petersii</i>	Peters' Clawed Frog	LC	WS	U
	<i>Mertensophryne mocquardi</i>	Mocquard's Toad	LC	WS	U
	<i>Sclerophys funerea</i>	Angolan Toad	LC	WS	U
	<i>Sclerophys garmani</i>	Garman's Toad	LC	WS	U
	<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	WS	P
	<i>Sclerophrys poweri</i>	Power's Toad	LC	WS	U
	<i>Sclerophrys pusilla</i>	Flat-backed Toad	LC	WS	L
	<i>Sclerophrys regularis</i>	African Common Toad	LC	WS	P
	<i>Phrynomantis bifasciatus</i>	Banded Ruber Frog	LC	WS	U
	<i>Breviceps adspersus</i>	Common Rain Frog	NE	WS	U
	<i>Hemisis marmoratus</i>	Marbled Snout-Burrower	LC	WS	U
	<i>Hyperolius angolensis angolensis</i>	Angolan Reed Frog	LC	WS	U
	<i>Hyperolius benguellensis</i>	Benguela Long Reed Frog	LC	WS	U
	<i>Hyperolius bocagei</i>	Bocage's Reed Frog	LC	WS	U
	<i>Hyperolius chelaensis</i>	Chela Mountain	DD	ES	U
	<i>Hyperolius cinereus</i>	Ashy Reed Frog	LC	ES	U
	<i>Hyperolius concolor</i>	Variable Reed Fro	LC	WS	U
	<i>Hyperolius nasutus</i>	Large-Nosed Long Reed Frog	LC	WS	P
	<i>Kasina kuvangensis</i>	Kuvangu kasina	LC	WS	U
	<i>Kasina senegalensis</i>	Senegal kasina	LC	WS	P
	<i>Leptopelis anchietae</i>	Anchieta's Tree Frog	LC	ES	U
	<i>Leptopelis bocagii</i>	Bocage's Tree Frog	LC	WS	U
	<i>Leptopelis cynamoneus</i>	Angolan Forest Tree Frog	LC	WS	U
	<i>Hildebrandtia ornata</i>	Ornate Frog	LC	WS	U
	<i>Hildebrandtia ornatissima</i>	Angola Ornate Frog	DD	ES	U
	<i>Ptychadena anchietae</i>	Anchieta's Grass Frog	LC	WS	P
	<i>Ptychadena ansorgii</i>	Ansorge's Grass Frog	LC	WS	U
	<i>Ptychadena bunoderma</i>	Rough Grass Frog	LC	WS	U
	<i>Ptychadena grandisonae</i>	Grandison's Grass Frog	LC	WS	U
	<i>Ptychadena mascareniensis</i>	Mascarene Grass Frog	LC	WS	U
	<i>Ptychadena oxyrhynchus</i>	Sharp-Nosed Grass Frog	LC	WS	U
	<i>Ptychadena porosissima</i>	Striped Grass Frog	LC	WS	U
	<i>Phrynobatrachus cryptotis</i>	Cryptic River Frog	DD	WS	U
	<i>Phrynobatrachus mababiensis</i>	Mababe Puddle Frog	DD	WS	U
<i>Phrynobatrachus natalensis</i>	Natal Dwarf Puddle Frog	LC	WS	P	
<i>Amietia angolensis</i>	Angola River Frog	LC	WS	U	
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	LC	WS	U	
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	WS	U	
<i>Tomopterna tuberculosa</i>	Rough Sand Frog	LC	WS	P	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de dados das Espécies de Anfíbios da Huíla					60KV DL
Ordem	Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	
					PRESENCE
	<i>Amnirana darlingi</i>	Darling's White - Lipped Frog	LC	WS	U

Legend:

1 (LVEA): Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 (IUCN): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

3 (ENDEMISM): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies

4 (SEASONALITY): R - Resident; M - Migratory

5 (RISK): H - High; M - Medium; L - Low

6 (PRESENCE): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 6

REPTILES LIST

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Pelomedusa subrufa</i>	Helmeted Terrapin	NE	WS	U
<i>Pelusios nanus</i>	African Dwarf Mud Turtle	NE	WS	U
<i>Pelusios rhodesianus</i>	Variable Mud Turtle	LC	WS	U
<i>Kinixys spekii</i>	Spek's Hinged-Back Tortoise	NE	WS	U
<i>Stigmochelys pardalys</i>	Leopard Tortoise	LC	WS	U
<i>Crocodylus niloticus</i>	Nile Crocodile	LC	WS	U
<i>Afroedura vazpintorum</i>	Coastal Flat Gecko	NE	ES	U
<i>Conrodactylus fitzsimonsi</i>	Button-Scaled Thick-Toed Gecko	NE	WS	U
<i>Conrodactylus laevigatus</i>	Button-Scaled Thick-Toed Gecko	NE	WS	U
<i>Hemidactylus mabouia</i>	Tropical House Gecko	NE	WS	L
<i>Hemidactylus benguellensis</i>	Benguela Tropical Gecko	NE	WS	P
<i>Lygodactylus nyanyeka</i>	Nyaneka Dwarf Gecko	NE	WS	P
<i>Pachydactylus angolensis</i>	Angolan Thick-Toed Gecko	NE	ES	U
<i>Pachydactylus punctatus</i>	Speckled Thick-Toed Gecko	NE	WS	P
<i>Pachydactylus scherzi</i>	Scherz's Thick-Toed Gecko	NE	WS	U
<i>Rhoptropus montanus</i>	Mountain Namib Day Gecko	NE	WS	U
<i>Dalophia pistillum</i>	Blunt-Tailed Worm Lizard	NE	WS	U
<i>Monopeltis anchietae</i>	Anchieta's Worm Lizard	NE	WS	U
<i>Monopeltis perplexus</i>	Wedge-Snouted Worm Lizard	NE	ES	U
<i>Ichnotropis bivittata bivittata</i>	Angolan Rough-Scale Lizard	NE	WS	U
<i>Ichnotropis bivittata pallida</i>	Cape Rough-Scaled Lizard	NE	ER	U
<i>Meroles squamulosa</i>	Common Rough-Scaled Lizard	NE	WS	U
<i>Nucras tessellata</i>	Western Sandveld Lizard	NE	WS	U
<i>Pedioplanis benguellensis</i>	Bocage's Sand Lizard	NE	WS	U
<i>Chamaesaura miopropus</i>	Zambian Snake Lizard	NE	WS	U
<i>Cordylus angolensis</i>	Angolan Girdled Lizard	NE	ES	U
<i>Cordylus machadoi</i>	Machado's Girdled Lizard	NE	NE	U
<i>Gerrhosaurus nigrolineatus</i>	Black-Lined Plated Lizard	NE	WS	P
<i>Matobosaurus maltzahni</i>	Western Giant Plated Lizard	NE	WS	U
<i>Eumecia anchietae anchietae</i>	Western Serpentineform Skink	NE	WS	U
<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	LC	WS	U
<i>Panaspis cabindae</i>	Cabinda Snake-Eyed Skink	DD	WS	U
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-Eyed Skink	NE	WS	U
<i>Sepsina angolensis</i>	Angolan Reduced-Limb Skink	NE	WS	U
<i>Trachylepis albopunctata</i>	Angolan Variable Skink	NE	WS	P
<i>Trachylepis bayonii</i>	Bayão's Skink	DD	WS	U
<i>Trachylepis binotata</i>	Ovambo Tree Skink	NE	WS	U
<i>Trachylepis chimbana</i>	Chimba Skink	NE	WS	U
<i>Trachylepis monardi</i>	Monard's Skink	NE	ES	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	PRESENCE
<i>Trachylepis punctulata</i>	Speckled Sand Skink	NE	WS	U
<i>Trachylepis sulcata</i>	Western rock Skink	NE	WS	L
<i>Trachylepis wahlbergii</i>	Wahlberg's Striped Skink	NE	WS	U
<i>Varanus albigularis angolensis</i>	Angolan White-Throated Monitor	LC	WS	U
<i>Varanus niloticus</i>	Nile Monitor	LC	WS	U
<i>Chamaeleo anchietae</i>	Anchieta's Chameleon	LC	WS	U
<i>Chamaeleo dilepis quilensis</i>	Quilo Flap-Neck Chameleon	LC	WS	U
<i>Acanthocercus cyanocephalus</i>	Angolan Tree Agama	LC	WS	U
<i>Agama aculeata</i>	Western Ground Agama	LC	WS	P
<i>Agama schacki</i>	Schack's Rock Agama	NE	ES	R
<i>Afrotyphlops anomalus</i>	Angolan Giant Blind Snake	NE	ES	U
<i>Afrotyphlops schlegelii</i>	Schlegel's Giant Blind Snake	NE	WS	U
<i>Leptotyphlops scutifrons</i>	Peters' Thread Snake	NE	WS	U
<i>Namibiana rostrata</i>	Angolan Beaked Thread Snake	DD	ES	U
<i>Python natalensis</i>	Southern African Rock Python	NE	WS	U
<i>Bitis arietans</i>	Puff Adder	NE	WS	U
<i>Bitis caudalis</i>	Horned Adder	NE	WS	U
<i>Bitis gabonica</i>	Gabon Adder	NE	WS	U
<i>Bitis heraldica</i>	Angolan Adder	NE	ES	U
<i>Causus bilineatus</i>	Two-Striped Night Adder	NE	WS	U
<i>Causus rhombeatus</i>	Rhombic Night Adder	NE	WS	U
<i>Aparallactus capensis</i>	Cape Centipede Eater	LC	WS	U
<i>Atractaspis congica</i>	Congo Stiletto Snake	NE	WS	U
<i>Boaedon angolensis</i>	Angolan House Snake	NE	ES	P
<i>Hemirhagerrhis viperina</i>	Western Bark Snake	NE	WS	U
<i>Limaformosa capensis</i>	Southern File Snake	LC	WS	U
<i>Lycophidion multimaclatum</i>	Spotted Wolf Snake	NE	WS	U
<i>Prosymna angolensis</i>	Angola Shovel-Snout snake	LC	WS	U
<i>Prosymna visseri</i>	Visser's Shovel-Snout Snake	NE	WS	U
<i>Psammophis angolensis</i>	Dwarf Sand Snake	NE	WS	U
<i>psammophis ansorgii</i>	Link-Marked Sand Racer snake	NE	ES	U
<i>Psammophis leopardinus</i>	Leopard Sand Snake	NE	WS	U
<i>Psammophis mossambicus</i>	Olive Whip Snake	NE	WS	U
<i>Psammophis subtaeniatus</i>	Striped-Bellied Sand Snake	LC	WS	U
<i>Psammophylax acutus</i>	Striped Beaked Snake	NE	WS	U
<i>Psammophylax rhombeatus ocellatus</i>	Spotted Skaapsteker Snake	NE	ES	U
<i>Psammophylax tritaeniatus</i>	Striped Skaapsteker Snake	LC	WS	P
<i>Pseudaspis cana</i>	Mole Snake	NE	WS	U
<i>Dendroaspis polylepis</i>	Black Mamba	LC	WS	U

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

Base de Dados das Espécies de Répteis de Huíla				60KV DL
Nomes Científicos	Nomes em Inglês	IUCN	ENDEMISM	
<i>Elapsoidea guntherii</i>	Gunther's Garter Snake	NE	WS	U
<i>Elapsoidea semiannulata semiannulata</i>	Angolan Garter Snake	NE	WS	U
<i>Naja anchietae</i>	Anchieta's Cobra	NE	WS	P
<i>Naja melanoleuca</i>	Forest Cobra	NE	WS	U
<i>Naja nigricollis</i>	Black-Necked Spitting Cobra	NE	WS	U
<i>Crotaphopeltis hotamboeia</i>	Red-Lipped Snake	NE	WS	U
<i>Dasypeltis palmarum</i>	Palm Egg Eater	NE	WS	U
<i>Dasypeltis scabra</i>	Common Egg Eater	LC	WS	U
<i>Dispholidus typus punctatus</i>	Spotted Boomslang	NE	WS	U
<i>Philothamnus angolensis</i>	Angolan Green Snake	NE	WS	U
<i>Philothamnus dorsalis</i>	Striped Green Snake	NE	WS	U
<i>Philothamnus heterolepidotus</i>	Slender Green Snake	NE	WS	U
<i>Philothamnus ornatus</i>	Ornate Green Snake	NE	WS	U
<i>Philothamnus semivariegatus</i>	Spotted Bush Snake	NE	WS	U
<i>Thelotornis capensis oatesi</i>	Oate's Twig Snake	LC	WS	U
<i>Limnophis bicolor</i>	Bicolored Swamp Snake	NE	WS	U
<i>Natriciteres bipostocularis</i>	Southwestern Forest Marsh snake	NE	WS	U

Legend:

1 (**LVEA**): Angolan Red List for Threatened Species: NE (Not Evaluated), Vul (Vulnerable);

2 (**IUCN**): LC - Least Concern; DD - Data Deficient; NT - Near Threatened; VU - Vulnerable; EN - Endangered; CR - Critically Endangered

3 (**ENDEMISM**): WS - Widespread Species; ES - Endemic Species; NE - Near Endemic Species; ER – Endemic Subspecies


4 (**SEASONALITY**): R - Resident; M - Migratory

5 (**RISK**): H - High; M - Medium; L - Low

6 (**PRESENCE**): R – Recorded; L - Likely to be recorded; P - Possible to be recorded; U - Unlikely to be recorded

APPENDIX 7

MINUTES OF STAKEHOLDER MEETINGS

60 kV Distribution Line Project between Lubango East and Arimba Substations	MEETING MINUTES Stakeholder Engagement		
		Project: P.1649	
VENUE: Arimba Commune, Community Jango.	DATE: 15/06/2022	NUMBER OF PAGES: 10	
SUBJECT: Stakeholder Engagement Meeting (Phase 2)	NOTES BY: Elayne Miranda & Eduardo Ferdinand	TIME: 14h15 pm to 16h15 pm	REVISION: Vladimir Russo

ANNEXES**Annex 1** - Photographic record**Annex 2** - Attendance list**Annex 3** - Presentation**COPIES SENT TO:**

- National Electricity Distribution Company (ENDE - E.P.).
- National Electricity Transmission Network Company (RNT - E.P.).
- Japan International Cooperation Agency (JICA).
- Tokyo Electric Power Services Co., Ltd (TEPCO).
- Ministry of Energy and Water (Ministério da Energia e Águas - MINEA).
- Ministry of Culture, Tourism and Environment (Ministério da Cultura, Turismo e Ambiente - MCTA).
- Government of Huíla Province.

ITEM	DESCRIPTION
1	The stakeholder engagement meeting was held on 7 th June 2022 with representatives of the Arimba Communal Administration, traditional authorities, residents and other stakeholders. The opening ceremony began at 14h15 at the Community Jango of the Arimba Communal Administration (14°56'50.04 "S 13°35'45.01 "E). The meeting was attended by several entities with special emphasis on the Head of Section of the Arimba Communal Administration Mr. Alegria Kulunetos, the representatives of Holísticos (Eduardo Ferdinand and Elayne Miranda), the National Electricity Distribution Company (ENDE - Nobel Adão, Paulo Máquina and João António) and the National Electricity Transmission Network (RNT - Catarino Cosme, Leitão Alexandre, Romualdo Pimentel and Manuel Domingos).
2	The stakeholder engagement meeting was attended by 36 participants (16% of whom were female). The Head of Section of the Arimba Communal Administration, Mr. Alegria Kulunetos (AK) welcomed those present, and spoke about the importance of the Project from the point of view of development and boosting the economy of the Arimba commune, also highlighting the municipality of Lubango. Knowing that many of those present did not understand clearly and transparently the Portuguese language it was translated into the local language Nhaneca-Humbi.
3	The representative of the company Holísticos, Eduardo Ferdinand (EF) took the opportunity to make an introduction about the 220 kV Lubango-Moçâmedes Transmission Line Project. He mentioned that the stakeholder engagement process is extremely important for the materialization of the Project, referring that the two Projects are being promoting by the National Electricity Distribution Company (ENDE) and the

	<p>National Electricity Transmission Network (RNT) in collaboration with the Japanese Company Tokyo Electric Power Services Co., Ltd. (TEPSCO) with financing from the Japan International Cooperation Agency (JICA). He also pointed out that the Projects are aligned with JICA's Performance Standards for Environmental and Social Issues (<i>JICA Guidelines for Environmental and Social Considerations, 2010</i>).</p>
4	<p>The representative of ENDE - Nobel Adão (NA) made some remarks about the Project and its promotion for the Lubango municipality, Huíla province. He stressed that the main objective of the Project is to improve the electricity supply in the Lubango city, meeting the needs of various consumers, as well as allowing the connection of the electricity transmission systems between the North and Centre-South regions. NA explained that the Project addressed the need to transport the electricity generated at the Laúca Dam in Malanje province, with a capacity to produce over 2,000 MW, passing through the Belém do Dango Substation in Huambo province, and by the Nombungo Substations in East Lubango and Arimba (in Huíla province) and then by Novo Namibe in Moçâmedes.</p>
5	<p>Elayne Miranda (EM) spoke about the construction Project for of the 60 kV electricity distribution line and the Arimba Substation, explaining the options of the route and the various alternatives mapped out until the definition of the final route for the passage of the electricity distribution line, presenting the constraints (public and private properties that are within the Project's right-of-way of 24 metres), the environmental and social surveys that were in progress as part of the preparation of the Simplified Environmental Study (SES) report. EM made a brief presentation of the main environmental, socio-economic and cultural impacts associated with the different phases of the Project and the respective mitigation and compensation measures.</p>
6	<p>EM also mentioned the census and registration of the parties potentially affected by the Project along the route of the transmission line carried out in December 2021 by the company Holísticos, having presented the results and referred to the importance of the Abbreviated Resettlement Action Plan (ARAP), which is nearing completion, and the Environmental and Social Management Plan of the Project. Regarding the stakeholder engagement, EM mentioned that its objective is to provide interested and potentially affected parties with an opportunity to learn about the Project, present opinions, suggestions and recommend mitigation measures and feasible compensations (technical, environmental, social and cultural) in order to ensure the sustainability of the Project. EM made a presentation that focused on the following points (see Annex 3 - Presentation):</p> <ul style="list-style-type: none"> • Brief Project Description (location and implementation alternatives); • Presentation of the Environmental Impact Assessment Process in force in the country; • Legal Framework and Requirements of the Project Financier (JICA); • Environmental and Socioeconomic Aspects of the 60 kV Distribution Line Route; • Results of the Census/Registration of Potentially Affected Parties (Questionnaires to Heads of Households); • Abbreviated Resettlement Action Plan (ARAP);

	<ul style="list-style-type: none"> • Evaluation of Environmental and Socioeconomic Impacts and Respective Mitigation Measures; • Involuntary Resettlement and Financial Compensation for Damage or Right-of-Way of Lines; • Environmental and Social Management Plan; • Question and answer session.
7	EM also explained that the Project intends to avoid as much as possible inhabited areas, cultivated areas, commercial and military aircraft manoeuvring spaces, grazing areas, and those with the historical experience of ethnolinguistic communities, cemeteries, leisure areas, etc. She ended the presentation, stating that the Simplified Environmental Study report of the Project is currently being validated by the promoter of the Project (ENDE) and the funding entity (JICA), and will later be submitted to the government authorities responsible for the activity of the Project and the environmental sector in Angola (Ministry of Energy and Water and the Ministry of Culture, Tourism and Environment) for environmental licensing purposes.
8	The summary of the question and answer session is presented in the table below.
NOTE	The government authorities, traditional authorities, civil society and residents praised the initiative of ENDE and RNT for conducting another clarification meeting on the Project in the Arimba region.

Question and Answer Session Summary

Comment/Question	Answer
<p>Manuel António (MA) - Resident.</p> <p>MA questioned about the process of resettlement and compensation in case of damage to the mines and affectation of houses.</p>	<p>Eduardo Ferdinand - Holísticos</p> <p>The Project is being funded by JICA which takes the issues of involuntary resettlement (for damage to infrastructure and livelihoods of others) and fair compensation very seriously and will not provide full funding to the Project unless these issues are properly analysed, avoided or compensated for under current Angolan law and JICA requirements where applicable.</p> <p>He stressed that the 60 kV electricity distribution line planned to be installed between the Lubango East and Arimba substations could not pass over houses, schools, hospitals and large trees whose height is over 8 m. However, he explained that there will be situations where this cannot be avoided, so ENDE and JICA have very explicit technical standards for such situations. An Abbreviated Resettlement Action Plan is being prepared for potentially affected parties, to ensure that families affected by the Project have the same</p>

Comment/Question	Answer
	<p>or better living conditions and welfare compared to those existing prior to the Project's development in the region.</p> <p>Compensation for lost plots and fruit trees will be carried out under the table of crop prices per square metre or hectare prepared by the then Ministry of Agriculture and Fisheries (National Agriculture Directorate), and everything will be duly agreed upon, signed and done transparently and honestly so that compensation is guaranteed to potentially affected parties.</p> <p>However, the amount to be paid for plots mapped as affected will be in function of the production of agricultural products by species that they present and not in function of the annual production that the farmer claims to produce. At the end of the whole registration process of the affected plot and compensation, the agricultural production monetarily compensated will be offered to the farmer (owner of the plot), with deadlines set for the collection of production.</p> <p>In cases where a house is affected by the Project, there will be a registration and evaluation of its value in the national market and the affected parties may receive a house with the same or even better conditions than the one displaced along the Project's route. During the construction of the houses, the recommendations or requests of the affected families in terms of finishing and adjustment of the rooms will also be taken into consideration.</p> <p>Catarino Cosme - RNT</p> <p>He drew attention to the acts of opportunism, mentioning that only the affected and previously registered parties will receive compensation for the allocation of their houses, plots, and other structures. He pointed out that in the case of total or partial affectation of a house, the form of negotiation or compensation will be exclusively being provided with a house. He reinforced that the financial</p>

Comment/Question	Answer
	<p>compensations in case of resettlement of houses will be avoided due to the lessons learned in other projects promoted by RNT, giving the example that some people preferred to acquire electrical appliances and consumer goods, and ended being no longer able to build the houses.</p>
<p>Evaristo António (EA) - Coordinator of the Lola neighbourhood 2. Amélia Sacapito (AS) - Resident of the Tchiwaya neighbourhood. Ernesto Hiluco (EH) - Resident of 11 de Novembro.</p> <p>EA and AS stressed that they understood the explanations made about the Project, and suggested that the registration of houses along the route of the electricity transmission lines (houses, plots, grazing areas, etc.) should be done soon, to avoid possible opportunists. They also suggested holding stakeholder engagement meetings with families affected by the Project (farmers, owners of properties and land, etc.) to better clarify the Project and its potential negative and positive impacts before the implementation of reconfirmation works of the potentially affected parties and the beginning of possible compensations.</p> <p>EH informed that as coordinator of the 11 de Novembro neighbourhood he had not taken note of the census work of the people and properties present on the route of the 60 and 220 kV Projects.</p> <p>EH Suggested that the neighbourhood coordinators be involved in future activities in order to eliminate the presence of possible opportunists and/or avoid acts of injustice. He concluded by praising the Government's initiative, and that the community of the 11 de Novembro neighbourhood willingly accepts its implementation since it will benefit from the power of the 60 kV distribution line.</p>	<p>Eduardo Ferdinand - Holísticos</p> <p>He explained in detail the census work of the potentially affected parties that was carried out in November (RNT) and December (ENDE) 2021 along the routes of the two Projects presented. He informed that for safety reasons and compliance with international standards, houses, schools, hospitals and other infrastructures of a permanent nature cannot be permitted on the 220 kV (45 m) and 60 kV (24 m) Project easement.</p> <p>He stressed that the routes presented are not the final ones and that a set of studies will be carried out to determine the final route, highlighting the studies of soils, geology, topography, geomorphology, etc. He stressed that before the implementation of the Project, the project promoters have also been taking into consideration the cost-benefit effect prior to the compensation decision.</p> <p>Good note was taken on the suggestion of Mr. EH.</p> <p>Nobel Adão - ENDE</p> <p>He noted that with the implementation of the 60 kV electricity distribution line Project and the operation of the Arimba Substation it would now be possible to distribute electricity to more communities in Arimba commune and Lubango municipality.</p> <p>He asked those present and the representatives of the Arimba Communal Administration, to massively disseminate the Project and the meetings to the absent parties in order to be informed about the Project.</p>

Comment/Question	Answer
<p>Francisco Tchihena (FT) - Resident of the Muhaha neighbourhood.</p> <p>FT questioned whether there is a need to abandon his house now, as it is very close to the site of the future Lubango East Substation.</p> <p>FT said that work was currently underway to clear the vegetation on the site of the future Lubango East Substation.</p>	<p>Eduardo Ferdinand - Holísticos</p> <p>He mentioned that it was extremely premature to relocate the population close to the perimeter of the site of the future Lubango East Substation. However, he explained that their continuity will depend on the safety limits (international safety standards) necessary for the safety of people and the Project. He stressed that the companies ENDE/RNT have started a process to create working committees for the permanent and frequent monitoring of the final route of the two Projects will be in place in order to avoid opportunists (people who choose to build houses on the final route of the transmission lines so that they can benefit monetarily).</p> <p>Catarino Cosme - RNT</p> <p>He explained that the compensation process will be assured by the Angolan Government and not by JICA. He asked for support from the community so as not to increase the costs of the Project with the emergence of possible opportunists.</p> <p>The vegetation removal works on the Project's land are only for the placement of boundary markers, land delimitation and occupation signage (RNT - Lubango East Substation).</p>
<p>There being no further questions, the Stakeholder Engagement was closed by the Head of the Energy and Water Section of the Arimba Communal Administration, Mr. Alegria Kulunetos, who gave some considerations and guidance to the community members.</p>	

Annex1: Photographic Record.



Photo 1: Detail of those present at the stakeholder engagement meeting in Arimba commune (Phase 2 (ENDE) and Phase 4 (RNT)).



Photo 2: Opening of the stakeholder engagement meeting in Arimba commune by Mr. Alegria Kulunetos.



Photo 3: Presentation of the Project by Elayne Miranda (Holísticos).



Photo 4: Intervention by Mr. Francisco Tchihena.







Photo 5: Clarification from Mr. Catarino Cosme (RNT).



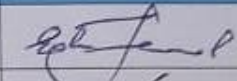

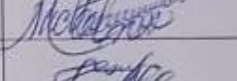

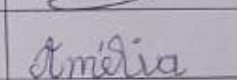
Photo 6: Clarification from Mr. Nobel Adão (ENDE).

Annex 2: Attendance List.

ESTUDO AMBIENTAL SIMPLIFICADO DO PROJECTO DE PROJECTO DA LINHA DE DISTRIBUIÇÃO DE ELECTRICIDADE DE 60 KV ENTRE A SUBESTAÇÃO DO LUBANGO LESTE E A SUBESTAÇÃO DA ARIMBA

LISTA DE PRESENCAS (LOCAL): Asimba (Janga Comunitário) DATA: 07 /JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Eduardo Fedinand	Holísticos	Ey- Ambiental	925 75 3714	
Alegria M. V. Kuluneta	Adm. Comunal Arimba	Ch. Sec. Co	92372 11 82	
Michel Adunuco	Adm. Comunal Jamba	Director Gabinete	925-318-663	
João Anão Cabral	Adm. Co. Arimba	Sec. Gas.	933-051-299	
Mauco E. Lomba	" "	Coord. bai. N.º 1	924343812	
Amélia N. Lacapita	Esc. n.º 903 Bundo	Directora	925473157	Amélia
Domingos Jari	Adm. Comunal Arimba	D.P. de Arimba	92719 35 75	Domingos
Manuel António	Mupanda	presidente M.R.	923394981	
Jose Francisco	Figueira		928731272	
IA 70 2 11 2007			928103607	
Fernando Miguel Paulo	Adm. Comunal da Arimba	Historista da Administradora	923623535	Fredy
Antonio H. Buale	Coordenador	Bairro Mupanda	933113740	

Página 1 | 1

ESTUDO AMBIENTAL SIMPLIFICADO DO PROJECTO DE PROJECTO DA LINHA DE DISTRIBUIÇÃO DE
ELECTRICIDADE DE 60 KV ENTRE A SUBESTAÇÃO DO LUBANGO LESTE E A SUBESTAÇÃO DA ARIMBALISTA DE PRESENCAS (LOCAL): Arimba (Jango Comunitario)DATA: 07 / JUNHO / 2022


NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
José Isaac Kassala	Nº 94360983	Bairro Kaporisa		
Orville Mamefflin	Coord. Bº Lela W-73601246	Bairro Lg-2 921538893		[Assinatura]
José-Manuel Heslinzi	Cooperador	Bairro Hambalanga P.		[Assinatura]
Schibena Albite	1º secretário	Bairro Poires		
Paulonga P. Catil	Seculo do No Lunga			
Ernesto Wiluco	93461347	Bairro MBugula		[Assinatura]
Ernesto Domingos	948006522			
Delfina Jamba	941596594			
José António	921888564	Bairro Poires		
Franisco Yibera	935641644			
Domingos José	927193575			
Amélia P. Lacapita	925473157	schimaria		Amélia
Henriqueta Marcanhos	945630612	Bairro - Ngai 2	Vice - Coordenadora	[Assinatura]

LISTA DE PRESENCAS (LOCAL):

Arimba (Ganga Comunitária)

DATA: Arimba / JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Linda T. Talavala	945476088	Tchivwaia		
Filipe Suelo				
José Luis Miguens	ENDE - R. Seal	Chefe de Engenharia	925584524	
João Kueca & António	ENDE	NMCR - AF-NIA	940152340	
Nelson Aclás	ENDE - DEM-RS	DAI	925768572	
Zeitao Alexandre	LNT-EP	Técnico de Ambiente	924715393	
Romualdo Pimentel	RNT-EP	Técnico de Q&SA	943646862	
Manuel Domingos	RNT-EP	Técnico Planeamento	922285845	
CATALINO COSTA	RNT-EP	Sociólogo	912355412	
Eloyna Miranda	RNT-EP	Eng. Ambiental	926962360	Eloyna Miranda

220 kV Transmission Line Project between Lubango - Moçâmedes		MEETING MINUTES Stakeholder Engagement			
		Project: P.1649			
LOCAL:	Bibala Municipality Headquarters - Bibala Secondary School Auditorium.	DATE:	16/06/2022	NUMBER OF SHEETS:	15
SUBJECT:	Stakeholder Engagement Meeting (Phase 4)	NOTES BY:	Elayne Miranda & Eduardo Ferdinand	TIME:	10h00 am to 12h00 pm
				REVISION:	Vladimir Russo

ANNEXES

Annex 1 – Photographic Record

Annex 2 – Attendance List

Annex 3 – Presentation

CÓPIAS ENVIADAS PARA:

- National Electricity Transmission Network Company (RNT - E.P.).
- Japan International Cooperation Agency (JICA).
- Tokyo Electric Power Services Co., Ltd. (TEPESCO).
- Ministry of Energy and Water (MINEA).
- Ministry of Culture, Tourism and Environment (MCTA).
- Government of Namibe Province.
- Government of Huíla Province.

ITEM	DESCRIPTION
1	On June 9 th , 2022 a stakeholder engagement meeting was held in the municipality of Bibala. The opening ceremony of the stakeholder engagement meeting for the 220 kV Electricity Transmission Line Project between the provinces of Huíla and Namibe started at 10h00 in the Auditorium of the Bibala Secondary School. The meeting was attended by several entities with special emphasis on Amélia Camunheira (Municipal Administrator of Bibala), Pedro Hangula (Provincial Director of Culture, Tourism and Environment), Municipal Directors and public companies in the region of Bibala, Communal Administrators, Traditional Authorities of Bibala and representatives of Holísticos company (Eduardo Ferdinand and Elayne Miranda), the National Electricity Transmission Network Company (RNT - Catarino Cosme, Alexandre Leitão, Romualdo Pimentel and Manuel Domingos).
2	The stakeholder engagement meeting was attended by 69 participants (15% of whom were female). Her Excellency Amélia Camunheira (Bibala's Municipal Administrator) welcomed the participants, stating that it was not the first time that the municipality was consulted. She mentioned other meetings that have been held within the scope of the Project. She spoke of the importance of the Project for Namibe Province development and in order to boost its economy.
3	The RNT representative, Catarino Cosme, after introducing his colleagues and RNT work team members, presented a Project overview. He stated that the stakeholder engagement meeting with stakeholders is now in its fourth phase, and that the main objective was to present the results of the Environmental and Social Impact Study of the Project and receive the participant's suggestions and recommendations. He said that the meeting is extremely important for the Project implementation.

4	<p>The representative of Holísticos, Eduardo Ferdinand (EF) in his Power Point presentation of the Project on the 220 kV electricity transmission line Project and the construction of two (2) substations (Lubango East Substation and New Namibe) he started with an introduction on the main characteristics of the Project. He provided an explanation of the currently proposed route for the power transmission lines (has also highlighted the various location alternatives studied), the main results of the environmental, social and cultural field surveys, the potential environmental, social and cultural impacts (negative and positive) associated with the Project and the respective mitigation and compensation measures.</p>
5	<p>EF also mentioned the census and registration of the parties potentially affected by the Project along the route of the transmission line, carried out in November 2021 by Holísticos. He presented the results and referred to the importance of the Abbreviated Resettlement Action Plan, which is being concluded, and the Project Environmental and Social Management Plan.</p>
6	<p>EF indicated that the stakeholder engagement process is extremely important regarding for the Project implementation. He also mentioned that the Project is promoted by National Electricity Transmission Network Company (RNT, in collaboration with Tokyo Electric Power Services Co., Ltd. (TEPSCO) (a Japanese company) and with financing from the Japan International Cooperation Agency (JICA). He stressed that the main objective of the project is to improve the power supply to Huíla and Namibe Province, as well as to provide for the connection of the electricity transmission systems between the North and Centre-South regions.</p>
7	<p>EF explained that the Project addresses the need to transport the electricity generated at the Laúca Dam located in the province of Malanje. It can produce more than 2,000 MW to be supplied through Belém do Dango Substation, located in the Huambo Province, and Nombungo, Lubango Leste substations, in the Province of Huíla and subsequently Novo Namibe Substation, in Moçâmedes. He also said that the Project will be aligned with the JICA Performance Standards for Environmental and Social Considerations (JICA Guidelines for Environmental and Social Considerations, 2010). Regarding the stakeholder engagement meeting, EF mentioned that the objective was to provide stakeholders with the opportunity to learn about the Project, make suggestions and recommend feasible mitigation measures and compensations (technical environmental, social and cultural) in order to ensure the sustainability of the Project.</p>
8	<p>EF's presentation focused on the following points (see Annex 3 - Presentation):</p> <ul style="list-style-type: none"> • Brief Project Description (location and its execution alternatives); • Presentation of the Environmental Impact Assessment Process in force in the country; • Legal Framework and Requirements of the Project Funder (JICA); • Environmental and Socioeconomic Aspects of the 220 kV Transmission Line Route; • Results of the Registration of Potentially Affected Parties (Questionnaires to Heads of Households);

	<ul style="list-style-type: none"> • Abbreviated Resettlement Action Plan (ARAP); • Environmental and Socio-Economic Impact Assessment and related mitigation measures; • Involuntary Resettlement and financial compensation for damages or right-for power lines passage; • Angolan Entities involved in the Project Compensation Process; • Environmental and Social Management Plan; • Question and Answer Session.
9	EF also explained that the Project intends to avoid as much as possible inhabited areas, cultivated areas, commercial and military aircraft manoeuvring spaces, grazing areas, transhumance areas used by ethno linguistic communities, areas with historical experience of ethno linguistic communities, cemeteries, recreation areas, etc. He concluded the presentation, mentioning that the report on the Project Environmental and Social Impact Study is currently being validated by the Project Sponsor (RNT) and funding entity (JICA), and will later be submitted to the supervising entities, namely, Ministry of Energy and Water and the Ministry of Culture, Tourism and Environment) for environmental licensing purposes.
10	The summary of the question and answer session is shown in the following table.

Question and Answer Session Summary

Comment/Question	Answer
<p>Dário Tomás (DT) – ADPP “Ajuda de Desenvolvimento de Povo para Povo”.</p> <p>DT questioned the safety distances of the Project in relation to houses, ploughs, schools and if the route of the Project should cross the area of the Fenda da Tundavala. He also questioned if Babila Municipality Babila will benefit from the Project.</p> <p>Bernar Aleluia (BA) – Advisor.</p> <p>BA requested the interconnection between the very high voltage electricity transmission and distribution Projects. He questioned whether the communities near the Project route will benefit from that electricity.</p> <p>Remidor Nanga (RN) – Municipal Fire Chief.</p> <p>RN requested possibility of power distribution to the communities living in the Project route be analyzed.</p>	<p>Catarino Cosme - RNT.</p> <p>He mentioned that only physical infrastructure (e.g. houses and schools) that are within the Project 45 meter easement will be compensated, so infrastructures that are not within this area will not be compensated.</p> <p>If a house is relocated by the Project, there will be a registration and evaluation of its market value, and the affected parties will be able to receive a house that will be built within safety limits, with the same or even better conditions than the displaced person’s house living along the Project route.</p> <p>He stressed that the Project is exclusively for the transport of electricity between the 220/60 kV Lubango East Substation and the New Namibe 220/60 kV Substation to be built in Moçâmedes. He clarified that under the Transformation Program of the National Electricity Sector three Angolan companies are responsible for providing</p>

Comment/Question	Answer
	<p>power production and distribution services in the country, namely: PRODEL (Production), RNT (Transmission) and ENDE (Distribution). In the first phase RNT will build the Lubango-Moçâmedes electricity transmission line. Then it will move to the distribution phase, in which ENDE in collaboration with the Provincial Government of Namibe and municipal administrations will analyze the demand for energy and create alternatives for its distribution from Moçâmedes Substation. However, it was emphasized that the project is exclusively for the transport of electricity between the Lubango East 220/60 kV Substation and New Namibe 220/60 kV Substation to be built in Moçâmedes.</p> <p>Eduardo Ferdinand – Holísticos.</p> <p>He explained in detail the route of the transmission line from Arimba to Moçâmedes. He said that it will not pass through the region of Fenda da Tundavala or Serra da Leba. He also highlighted the importance of the two (2) regions from the environmental point of view (IBA0023 of Fenda da Tundavala) and the historical-cultural heritage and tourism.</p>
<p>Amélia Camunheira (AC) - Bibala's Municipal Administrator.</p> <p>AC questioned the technical viability of the municipal seat of Bibala and the regions of Muinho and Caraculo benefiting from the energy transported by the Project.</p>	<p>Catarino Cosme – RNT.</p> <p>He said that the funding requested from JICA by the Angolan government includes only the power transport from the Nombungo and Lubango East substations (in the province of Huila) to New Namibe Substation in Moçâmedes (in the province of Namibe). Subsequently, additional funding will be requested for satellite projects for electricity distribution to other municipalities in Namibe Province.</p> <p>Manuel Domingos – RNT.</p> <p>The Angolan government, through the Ministry of Energy and Water, has drawn up a program for the electrification of all the country's municipalities and some nearby communes using hybrid and photovoltaic plants. Experimental projects are underway in the Province of Cabinda.</p>
<p>Jones Mutimo (JM) – Municipal Director of Education.</p>	<p>Catarino Cosme – RNT.</p>

Comment/Question	Answer
<p>JM questioned if the agreement between the Angolan Government and JICA includes the award of scholarships to Angolan students. He questioned whether the <i>Instituto Médio Agrário do Kapangombe</i> (Kapangombe High School for Agriculture Sciences) will benefit from the electricity transported by the Project.</p>	<p>He stressed that the funding requested from JICA by the Angolan government includes only the transportation of power from the Nombungo and Lubango East Substations (in the province of Huila) to the New Namibe Substation in Moçâmedes (in the province of Namibe).</p> <p>As for social issues (scholarship), he informed that the presentation of Social Responsibility Programs will be required from all contractors bidding for the Project construction. However, RNT cannot any responsibility that it cannot fulfil.</p>
<p>Pedro Hangula (PH) – Director of the Provincial Office of Culture, Tourism and Environment.</p> <p>PH requested additional clarification on the resettlement and compensation process for parties affected by the Project. He questioned about the environmental recovery of the areas potentially affected by the Project construction.</p> <p>He informed that the current exploration of ornamental rocks in the Caraculo region has affected air quality and that recent studies have indicated that the well-being of the communities is affected. He requested that measures be taken to avoid the proliferation of particulate matter in the Project so as not to worsen the current condition of the region.</p>	<p>Eduardo Ferdinand – Holísticos.</p> <p>The Project is being funded by JICA and JICA takes the issues of involuntary resettlement (for damage to Third parties' infrastructures and means of sustenance) and fair compensation very seriously, and will not provide full funding to the Project unless these issues are properly analyzed, avoided or compensated under the Angolan law currently in force and applicable JICA requirements.</p> <p>He stressed that the 220 kV electricity transmission line planned to be installed between the Nombungo, Lubango East and New Namibe substations cannot overhead houses, schools, hospitals and large trees, or exceed 35 meters high. However, he explained that there will be situations where this cannot be avoided, so RNT and JICA have very explicit technical standards for these situations. An Abbreviated Resettlement Action Plan (ARAP) is being developed for potentially affected parties to ensure that families affected by the Project will have the same or better living conditions and social welfare than prior to the Project development in the region.</p> <p>The compensation for the lost farms and fruit trees will be made according to the crop price table per square meter or hectare produced by the then Ministry of Agriculture and Fisheries (National Agriculture Directorate). All the terms will</p>

Comment/Question	Answer
	<p>be duly agreed upon, signed and executed in a transparent and honest manner, in order for the relevant compensation be guaranteed to the potentially affected parties.</p> <p>However, the value to be paid for the farms mapped as affected will be depend on the agricultural produce per species that they present and not on the annual produce that the farmer claims to produce. At the end of the whole registration process of the affected farms and relevant compensation, the monetary amount of the agricultural produce will be offered to the farmer (owner of the farm), with deadlines established for the collection of the produce.</p> <p>In case a house is affected by the Project, there will be a registration and evaluation of its value in the national market and the affected parties may receive a house with the same or even better conditions than the house of the displaced person existing along the Project route. During the construction of the houses, the recommendations or requests of the affected families in terms of finishing and adjustment of the rooms will also be taken into consideration.</p> <p>Regarding the vegetation removed in the Project route, EF responded that JICA has contemplated a budget for all the negative effects that the Project may cause from involuntary resettlement, compensation for environmental damage and third-party property, etc. Regarding the plant biomass that will be removed in the route, he said that the scenario will be to compensate through the insertion of native plant species or those that are adapted to the climatic conditions of the region.</p> <p>He also said that where it is not possible to repopulate the vegetation, the Provincial Directorate of Culture, Tourism and Environment of Namibe should indicate alternative sites for compensation. EF suggested the creation of working</p>

Comment/Question	Answer
	<p>committees between RNT, the municipal administrations of Moçâmedes and Bibala, and the Namibe provincial directorates.</p> <p>Regarding atmospheric pollution in the Caraculo region and its negative effects on the health of the population, EF thanked the information and pointed out that the Environmental and Social Impact Assessment (ESIA) has several measures to mitigate the actions of the EPC likely to produce emissions of atmospheric pollutants (particulate matter) in the local atmosphere. He also mentioned that every six (6) months the EPC will conduct environmental monitoring of the work to ensure its sustainability, and that the environmental installation license to be issued by the Ministry of Culture, Tourism and Environment will also require such practice.</p>
<p>Pedro Hangula (PH) – Director of the Provincial Directorate of Culture, Tourism and Environment.</p> <p>Pedro Hangula questioned whether the power for the project will be sufficient to meet the energy needs of the province of Namibe and if planning was aligned with the various master plans of the province of Namibe.</p>	<p>Eduardo Ferdinand – Holísticos.</p> <p>EF replied that the studies or assessments regarding the energy needs of the Namibe province began in 2015 and several institutions in the region were consulted for this purpose. He highlighted that the Gabinete de Estudos, Planeamento e Estatística (Department of Studies, Planning and Statistics) (“GEPE”) provided at the time the Master Plan of the Namibe Province (he pointed out that the information was shared by the GEPE Namibe team at the stakeholder engagement meeting held with the Government of the Namibe Province in February 2021).</p> <p>He mentioned that the electricity transmission line is part of a broader strategic plan that aims to interconnect the transportation system of the country's Northern and Center-South regions.</p>
<p>Paulino Costa (PC) – Municipal Mobilizer.</p> <p>PC questioned the measures that will be implemented to prevent affected and resettled people from building again in the Project easement.</p>	<p>Catarino Cosme – RNT.</p> <p>During the Project operation phase, RNT will designate a team to monitor the Project route and infrastructure. The route must be cleared for safety and line maintenance reasons.</p>

Comment/Question	Answer
	<p>He informed that RNT will rely on the support of municipal administrations and the National Police to restrict land occupations in the easement strip. He explained the risks and dangers associated with cohabiting with a very high voltage electricity transmission line for human health and welfare. He concluded by sensitizing the attendees and possible opportunists about the risks to families.</p>
<p>There being no further questions, the stakeholder engagement meeting was closed by Her Excellency Amélia Camunheira, Municipal Administrator of Bibala, who made some considerations and provided guidance to the members of the Social Stakeholder Engagement Council of Bibala's Municipal Administration.</p>	

Annex 1: Photographic Record.



Photo 1: Detail of those present at the stakeholder engagement meeting in Bibala municipality (Phase 4).

Photo 2: Opening of the meeting by the Bibala's Municipal Administrator, Amélia Camunheira.

Photo 3: Presentation of the Project by Eduardo Ferdinand (Holísticos).







Photo 4: Bibala Traditional Authorities.

Photo 5: Intervention by Mr. Remidor Nanga, Municipal Fire Chief.

Photo 6: Intervention by Mr. Cristóvão Neto.


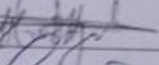

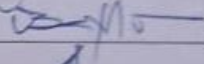

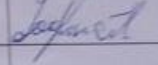
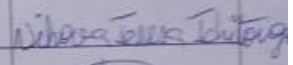

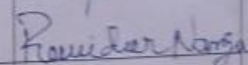

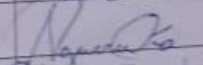
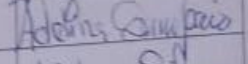
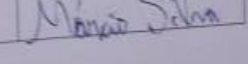
Annex 2: Attendance List

Tokyo Electric Power Services Co., Ltd.

ESTUDO DE IMPACTE AMBIENTAL E SOCIAL DO PROJECTO DE LINHA DE TRANSMISSÃO DE ELECTRICIDADE DE 220 KV LUBANGO (HUÍLA) - MOÇÂMEDES (NAMIBE) FASE 4 (EIAS)

LISTA DE PRESENCAS (LOCAL): Bitola DATA: 09 /JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Amélia Comunkela	Adm. Mun. Bitola	Adm. Municipal	923 4100 400	
Pedro Harigula	GPCTA	Director	931732211	
Gasparino Castro	RNT-EP	Sociólogo	912355412	
Vitorino Sampaio	Adm. Mun. Bitola	Adjunto	937110362	
Jandur Eduardo	Adm. M. Bitola	Adjunto	923 1090 80	
Leão Loureiro Juncos	Adm. Quilamba	Administrador	923368082	
Wihoea Teresa	Adm. Co. Kapangombe	Administr. Comunal	9292855176	
Aguinaldo Morfey	Adm. M. Bitola	Secretário Geral	924530691	
Remédios N. Nanga	Comite. M. Bombeiras	Comite. M. Bombeiras	936834428	
Maria Natália André	Administração M.O.B.	Directora Accp social	938421813	
Paula Aguiar	Adm. Mun. Bitola	Dir. Municipal	928146186	
Adelina Kumbi Simão	Hospital Municipal	Directora	926636358	
Mário M. do S. Silva	AGT-PFB	Chefe de PFB	924409135	

Página 1 | 1



Tokyo Electric Power Services Co., Ltd.



ESTUDO DE IMPACTE AMBIENTAL E SOCIAL DO PROJECTO DE LINHA DE TRANSMISSÃO
DE ELECTRICIDADE DE 220 KV LUBANGO (HUÍLA) – MOÇÂMEDES (NAMIBE)

FASE 4 (EIAS)

LISTA DE PRESENCAS (LOCAL): BeibalaDATA: 09 /JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Martinho P.D. Sawa	Coordenador	Coordenador	927242601	Martinho
Bronesto A. Waemdaenda	Coordenador	Coordenador	922849094	Bronesto
Domingos Pinheiro	Coordenador	Coordenador	927 26 35 67	Pinheiro
Mamef Uandak	Conselheiro	Conselheiro	941558156	Mamef
António Pomba	Conselheiro	Conselheiro	945090784	António
Paulino Costa	Coste	Mobilização Municipal	931572824	Paulino
Manasse Tchitame	Conselheiro	Conselheiro	985571271	Manasse
José Gaspar	Coordenador	Coordenador	925636482	José
Fernando Kapote	Coordenador	Comissão de Operadores	929147122	Fernando
Helena Masinga	Igreja Bomdeus	Secretaria	940 460 548	Helena
João Epalanga Ferreira	Desperitos	Eng: Ambiental	921929604	João
Luís Fernando	Holísticos	Motorista	925 75 39 14	Luís
Elías A.J. Higuete	R.N.T	Motorista	937131567	Elías



Tokyo Electric Power Services Co., Ltd.



ESTUDO DE IMPACTE AMBIENTAL E SOCIAL DO PROJECTO DE LINHA DE TRANSMISSÃO
DE ELECTRICIDADE DE 220 KV LUBANGO (HUÍLA) - MOÇAMÉDES (NAMIBE)

FASE 4 (EIAS)

LISTA DE PRESENCAS (LOCAL):

Bibala

DATA:

09

/JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Juiztelina S. A. Bibala	A.M. Bibala	Dire. Gab. Jurídico	9368314 17	Juiztelina Bibala
Padre Ricardinho	D.M. de Moçim da Água	Director Municipal	928450668	Ricardinho
Joaquim Fernandes	A.M. Bibala	Dire. Municipal	923700971	Joaquim Fernandes
Jose P. S. Marela	A.M. Bibala	Chef. Secção	946558755	Jose Marela
Jose Augusto Fomen	M.G.D. 88	Of. Justiça	923534597	Jose
Ericsson Domingos	D.M.E.	Chefe de Secção	926229236	Ericsson
José Nambulo Mutima	D.M.E.	Director	929673787	José Nambulo
Patrícia da Silva	A.M. Bibala	Dire. Gabinete	934120984	Patrícia
Helena Antero	Escola 25-Neelra	Chef. Secretário	928847869	Helena
Vindeli K. Ernesto Wilson	Adm. Municipal	D.M.D. E.I.	945953306	Vindeli
Manuê Xavier	Adm. Municipal	D.M. Agricultura	923-481649	Manuê
Pedro Munhoz Bibala	Adm. Municipal	Dire. Transportes	928969774	Pedro Munhoz
Cristovão Neto	EDA	Responsável	925069447	Neto



Tokyo Electric Power Services Co., Ltd.



ESTUDO DE IMPACTE AMBIENTAL E SOCIAL DO PROJECTO DE LINHA DE TRANSMISSÃO
DE ELECTRICIDADE DE 220 KV LUBANGO (HUÍLA) - MOÇÂMEDES (NAMIBE)

FASE 4 (EIAS)

LISTA DE PRESENCAS (LOCAL): BitolaDATA: 09 / JUNHO / 2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Manuel Tebinda	Daba grande	regedor		
AM Tomé M. Tchopa	Daba grande	Daba grande	921386709	
Bernard F. Alena	Conselheira	Conselheira	929925710	
Estevão Tavares	ENDE	CHEFE DE EQUIPA	927556612	
Dário Ndjombi	ADPP	coordenador de Emergência	923441076	
Albino Vanthemo	Munhoso	coordenador Zairo		
Manoela Bahulia	Mutapeira	coordenador Bairro		
Adelino Saboneto	Lajo misto	Conselheira	924924660	
Lino S. S. S.	Coordenador	Coordenador	945-570020	
Mário Nambo	Conselheiro	Conselheiro	925456004	
Jão A.P. Tchirau	Conselheiro	Coordenador	947502486	
Angelino Pedro Duó	Conselheiro	Coordenador	928784317	
António Ferreira	conselheiro	conselheiro	939627579	



ESTUDO DE IMPACTE AMBIENTAL E SOCIAL DO PROJECTO DE LINHA DE TRANSMISSÃO
DE ELECTRICIDADE DE 220 KV LUBANGO (HUÍLA) – MOÇÂMEDES (NAMIBE)


FASE 4 (EIAS)

LISTA DE PRESENCAS (LOCAL):

Betala

DATA: 09 / JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
João Alberto Samba	coordenador	coordenador	945011543	
Francis Colombe	Conselheiro	Avenida/Ind.º	936381843	
João Alberto Samba	Conselheiro	Coordenador	945011543	
Jose Maria Dindul	coord. Bairro	coord.	932639634	<i>[Signature]</i>
Dominique Beal	Coord. Bairro	Coord.	928680678	<i>[Signature]</i>
Manuel Cipriano Baptista	Minist. da Ref.ª	Comde Municipal D/C	931386037	<i>[Signature]</i>
Jose Sebastião S. Dias	LECA	Pastor	933091847	<i>[Signature]</i>
Aprone Tchiranga	IESK	Obreiro	931447287	<i>[Signature]</i>
Zacarias Tchiranga	People in Need	Gestor de Projectos	942864066	<i>[Signature]</i>
Frederico Linoagui	Igreja Apostolica	Pastor	948171991	<i>[Signature]</i>
Jose F. W. Cahamba	Igreja Luterana	Lider Espiritual	938963648	<i>[Signature]</i>
Yosi Soma	ADRA	T.D.C	929 929 979	<i>[Signature]</i>
Francisco K. Javela	Escola (Educação)	Professor	932250777	<i>[Signature]</i>

220 kV Transmission Line Project between Lubango – Moçâmedes Project and 60 kV Distribution Line Project between the East Lubango and the Arimba substations	MEETING MINUTES Stakeholder Engagement		
		Project: P.1649	
VENUE: Municipal Administration of Lubango (Headquarters)	DATE: 14/06/2022	NUMBER OF PAGES: 9	
SUBJECT: Stakeholder Engagement Meeting - Phase 2 (ENDE) and Phase 4 (RNT)	NOTES BY: Elayne Miranda & Eduardo Ferdinand	TIME: 14h30 to 15h40	REVIEW: Vladimir Russo

ANNEXES

Annex 1 – Photographic Record

Annex 2 – Attendance List

Annex 3 – Presentation

COPIES SENT TO:

- National Electricity Transmission Network Company (RNT – E.P.).
- National Electricity Distribution Company (ENDE - E.P.).
- Japan International Cooperation Agency (JICA).
- Tokyo Electric Power Services Co., Ltd. (TEPCO).
- Ministry of Energy and Water (MINEA).
- Ministry of Culture, Tourism and Environment (MCTA).
- Government of the Province of Huíla.
- Government of Namibe Province.

ITEM	DESCRIPTION
1	On June 9 th , 2022, a stakeholder engagement meeting was held with representatives of the Municipal Administration of Lubango and traditional authorities in the region. The opening ceremony of the stakeholder engagement meeting began at 14h30 at the Municipal Administration of Lubango. Several entities were present at the meeting, with special emphasis on the Deputy Municipal Administrator for the Technical Area, Orlando José Bras, the Community Administrator of Arimba, Ana Paula Domingos, Municipal Directors, Traditional Authorities, neighbourhood coordinators and representatives of Holísticos company (Eduardo Ferdinand and Elayne Miranda), the National Electricity Transmission Network Company (RNT - Catarino Cosme, Leitão Alexandre, Romualdo Pimentel and Manuel Domingos) and the National Electricity Distribution Company (ENDE – Nobel Adão).
2	The stakeholder engagement meeting was attended by 20 participants (10% of whom were female). The Deputy Municipal Administrator for the Technical Area, Orlando Bras, welcomed the participants, spoke about the importance of the Project regarding the development and boost of the Arimba commune economy, as well as the municipality of Lubango and the province of Huíla.
3	The RNT representative, Catarino Cosme, succeeded his RNT colleagues, made a brief introduction about the Project, mentioning that the stakeholder engagement meeting with the interested parties is already in its

	<p>fourth phase, and that the main objective was to present the results of the Environmental and Social Impact Study of the Project and obtain suggestions and recommendations from the participants. He classified the meeting as extremely important for the materialization of the Project.</p>
4	<p>Eduardo Ferdinand (EF), who started the presentation of the Project using a power point presentation of the Project for the 220 kV electricity transmission line and the construction of two (2) substations (East Lubango and Novo Namibe substation) and of the 60 kV distribution line Project, as well as the construction of the Arimba substation. He introduced the main characteristics of the Projects, explained the currently proposed route for the passage of the electricity transmission lines (also highlighting the various location alternatives studied), the main results of the environmental, social and cultural field surveys, the potential environmental, social and cultural impacts (negative and positive) associated with the Projects and the respective mitigation and compensation measures.</p>
5	<p>EF also mentioned the census and registration work of the parties potentially affected by the Project along the transmission line route carried out in November (RNT) and December (ENDE) 2021 by the company Holísticos. He also presented the results of the census and registration work and referred to the importance of the Abbreviated Resettlement Action Plan, which is being concluded, and the Project's Environmental and Social Management Plan.</p>
6	<p>EF pointed out that the stakeholder engagement process is extremely important regarding for the materialization of the Project. He said that the Projects are promoted by the National Electricity Transmission Network Company (RNT – E.P.) and the National Electricity Distribution Company (ENDE – E.P) in collaboration with the Japanese company Tokyo Electric Power Services Co., Ltd. (TEPSCO) and with financing from the Japan International Cooperation Agency (JICA). He stressed that the main goal of these Project is to improve the electricity supply to Huíla and Namibe provinces, as well as to enable the connection of electricity transmission systems between the North and Center-South regions.</p>
7	<p>EF explained that the Project addresses the need to transport the electricity generated at the Laúca Dam located in Malanje province - with capacity to produce more than 2000 MW - through the Belém do Dango Substation in Huambo province, and the Nombungo Substation, from East Lubango in the province of Huíla and then from Novo Namibe in Moçâmedes. He further said that the Project will align with the JICA Performance Standards for Environmental and Social Issues (JICA Guidelines for Environmental and Social Considerations, 2010). Regarding the stakeholder engagement meeting, EF mentioned that the objective was to provide interested parties with the opportunity to get to know the Project, make suggestions and recommend feasible mitigation and compensation measures (environmental, social and cultural techniques) in order to guarantee sustainability of the Project.</p> <p>EF made a presentation that focused on the following points (see Annex 3 – Presentation):</p>

	<ul style="list-style-type: none"> • Brief Description of the Project (location and its execution alternatives); • Presentation of the Environmental Impact Assessment Process in force in the country; • Legal Framework and Project Financing Requirements (JICA); • Environmental and Socio-economic Aspects of the 220 kV Transmission Line Layout; • Results of the Census/Registration of Potentially Affected Parties (Questionnaires for Heads of Households); • Abbreviated Resettlement Action Plan (ARAP); • Assessment of Environmental and Socio-economic Impacts and the Respective Mitigation Measures; • Involuntary Resettlement and Financial Compensation for Damages or Right-of-Way of the Lines; • Angolan Entities involved in the Project Compensation Process; • Environmental and Social Management Plan; • Question and Answer session.
8	<p>EF also explained that the Project intends to avoid as much as possible inhabited and cultivated areas, spaces for manoeuvring commercial and military aircraft, pasture areas, areas of transhumance used by ethnolinguistic communities, areas with historical background of ethnolinguistic communities, cemeteries, areas of leisure, etc. He ended the presentation by mentioning that the report of the Environmental and Social Impact Study of the Project and the Simplified Environmental Study are in the validation phase by the Project Promoting entity (RNT) and (ENDE) and financier (JICA), passing then to submission phase to the government authorities responsible for the Project's activity and for the environmental sector in Angola (Ministry of Energy and Water and the Ministry of Culture, Tourism and Environment) for the purposes of environmental licensing.</p>
9	<p>The table below provides a summary of the questions and answers session.</p>

Question and Answer Session Summary

Commentary/Question	Answer
<p>Orlando José Bras (OB) - Deputy Municipal Administrator for the Technical Area.</p> <p>OB praised the Project's initiative and also the presentation and said that the Project is an added value for the Huíla province. He also expressed that he was satisfied with the fact that the issue of compensation for the families that will be potentially affected by the implementation of the Project is safeguarded and with the generation of local employability.</p>	<p>Eduardo Ferdinand – Holísticos.</p> <p>He mentioned that since the Project will not start now, the population will be able to make use of the land for cultivation for the time being. As soon as an exact date for the start of the Project is planned, the RNT will inform the Local and Communal Administrations.</p>

Commentary/Question	Answer
<p>He stressed that the timing of the Project has to be taken into account, due to the end of the dry season, and the need to prepare the land for agriculture.</p>	
<p>Ana Domingos (AD) – Communal Administrator of Arimba.</p> <p>AD praised and was pleased with the Project's initiative because the lack of electricity in the Commune is a major concern. She has been following the Project since 2019, and whenever possible she participates in all meetings.</p>	
<p>Adilson Domingos (AD) – Municipal Director of Energy and Water.</p> <p>AD stressed that there is a need to know the final route of the Project, since it is already beginning to be widely publicized in the municipality, in order to avoid opportunism.</p> <p>He inquired about the resettlement process and compensation in the event of damage to the fields and allocation of houses, facilitating communication between the RNT and the Municipal and Communal Administration.</p>	<p>Eduardo Ferdinand – Holistic</p> <p>He stressed that the route presented is not the final one and that a set of studies will be carried out to determine the final route, highlighting studies of soils, geology, topography, geomorphology, etc. He stressed that before the execution of the Project its promoters will also consider the cost-benefit effect before the compensation decision, so that the Project doesn't become extremely expensive due to the compensation and physical resettlement process.</p> <p>Catarino Cosme – RNT</p> <p>The Project is being financed by JICA and it takes the issues of involuntary resettlement (for damage to infrastructure and allocations to the livelihoods of others) and fair compensation very seriously, and will not provide full Project funding until these issues are correctly analysed, avoided or compensated according to the Angolan legislation in force and where the JICA requirements are applicable.</p> <p>He stressed that the 60 kV electricity distribution line planned to be installed between the East Lubango and Arimba substations cannot pass over houses, schools, hospitals and large trees whose height is greater than 8 m. However, he explained that there will be situations in which this cannot be avoided, for which ENDE and JICA have very explicit technical standards for these situations. An Abbreviated Resettlement Action Plan is being prepared for</p>

Commentary/Question	Answer
	<p>the potentially affected parties, in order to ensure that the Project-affected families have the same or better living conditions and well-being compared to those existing prior to the Project's development in the region.</p> <p>Compensation for lost crops and fruit trees will be carried out in accordance with the crop price table per square meter or hectare produced by the then Ministry of Agriculture and Fisheries (National Directorate of Agriculture), and that everything will be duly agreed, signed and done transparently and honestly so that compensation is guaranteed to potentially affected parties.</p> <p>However, the amount to be paid for the fields mapped as affected will depend on the production of agricultural goods according to their species and not on the basis of the annual production that the farmer claims to produce. At the end of the entire process of registration of the affected field and compensation, the agricultural production monetarily compensated will be offered to the farmer, with deadlines for the collection of production.</p> <p>In the event that a house is allocated by the Project, there will be a registration and assessment of its value in the national market and the affected parties will be able to receive a house with the same conditions or even better than the one evicted along the Project's route.</p> <p>During the construction of the houses, the recommendations or requests of the affected families in terms of finishing and adjusting the partitions will also be taken into account.</p>
<p>Fábio António (FA) – Director of Agriculture</p> <p>FA praised the implementation of the Project, and asked about the distance that agricultural activities should have from the towers.</p>	<p>Catarino Cosme – RNT</p> <p>For the construction phase of the Project, there should be nothing in a 45-meter right-of-way along the Project's route, but after this phase and respecting the limits of the towers,</p>

Commentary/Question	Answer
	it will be possible to do agriculture again, not being possible to plant big trees.

Annex 1: Photographic Record.



Photo 1: Detail of those present at the stakeholder engagement meeting in Lubango (Phase 2 and Phase 4).

Photo 2: Opening of the meeting by the Deputy Administrator for the Technical Area, Orlando José Braz.

Photo 3: Presentation of the Project by Eduardo Ferdinand (Holísticos).




Photo 4: Great Chief (Soba Grande), Tayoka Kalume.

Photo 5: Presentation of Mr. Ernesto Domingos, Coordinator of the Nabungula neighbourhood.

Photo 6: RNT company representatives.

Annex 2: Attendance list.


ESTUDO AMBIENTAL SIMPLIFICADO DO PROJECTO DE PROJECTO DA LINHA DE DISTRIBUIÇÃO DE ELECTRICIDADE DE 60 KV ENTRE A SUBESTAÇÃO DO LUBANGO LESTE E A SUBESTAÇÃO DA ARIMBA

LISTA DE PRESENCAS (LOCAL): Administração Municipal Lubango

DATA: 09 /JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Orlando J. Brass	AML	Adm. Mun. Adj. P/Técnica	924424288	
Artur Manuel Domingos	AML	Director Municipal de EA	923224480	M. Domingos
Ana Paula Oliveira	AML	Adm. Promocional Ambiente	923528734	Paula Oliveira
Mae Tomáa Brimipi	AML	Adm. Adjunto C. Arimba	923432714	M. Brimipi
ERNESTO Domingos		Adj. Coordenado Lubango	943006522	
Kellishena Gerardo		Adm. Arimba		
Francisco Vilaça			935671646	
João Manuel Belirisi	Bairros Hangalango	Coordenador	921538993	J. Belirisi
Márcio Vaz Kaputo	AML	Técnico de Ambiente	926639235	
Ernesto Vilaca	Comunidade	Netungulo	937435717	Ernesto Vilaca
Dionísio J.C. Tomás	AML	CHT de Sarambaia	923931333	D. Tomás
J. S. Tomás		ZONA Grande	9218103654	J. S. Tomás
Nobel Adão	ENDE-DEM-RS	Div. Anal. Medicina	925768572	N. Adão

Página 1 | 1

ENDE JICA TEPSCO HOLÍSTICOS

ESTUDO AMBIENTAL SIMPLIFICADO DO PROJECTO DE PROJECTO DA LINHA DE DISTRIBUIÇÃO DE ELECTRICIDADE DE 60 KV ENTRE A SUBESTAÇÃO DO LUBANGO LESTE E A SUBESTAÇÃO DA ARIMBA

LISTA DE PRESENCAS (LOCAL): Administração Municipal do Lubango DATA: 09 /JUNHO/2022

NOME	INSTITUIÇÃO	FUNÇÃO	CONTACTOS	ASSINATURA
Flávia Muxomba	Holísticos	Eng. Ambiental	926962360	Flávia Muxomba
Romário Pimentel	RNT-EP	Técnico de PSSA	943646862	Romário Pimentel
Manuel Domingo	RNT-EP	Técnico de Planeamento	922235345	Manuel Domingo
Luís Alexandre	RNT-EP	Técnico de Ambiente	924715393	Luís Alexandre
Eduardo Jerónimo	Holísticos	Eng. Ambiental	925755914	Eduardo Jerónimo
Fócio António	AMC	Director Agricultura	924380423	Fócio António
Catalino Casca	RNT-EP	Sociólogo	912355412	Catalino Casca

Página 1 | 1

Potenciais Impactes

Os principais impactes identificados foram os seguintes:

Fase de Construção do Projecto

Positivos

- Criação de empregos.
- Dinamização socioeconómica.

Negativos

- Perda e perturbação de habitats.
- Perda permanente dos recursos do solo.
- Alteração do ambiente sonoro da área.
- Redução pontual da qualidade do ar.

Fase de Operação do Projecto

Positivos

- Criação de empregos.
- Dinamização socioeconómica.
- Aumento do fornecimento de electricidade.

Negativos

- Alteração da paisagem.
- Restrições no uso do solo.

Plano de Gestão Ambiental e Social

Para a implementação deste projecto foi elaborado um Plano de Acção Ambiental e Social que será apoiado por um conjunto de planos de gestão onde se destacam os seguintes:

- Plano de Gestão de Resíduos
- Programa de Saúde, Segurança Ocupacional e Ambiente
- Plano de Gestão da Construção
- Plano de Resposta à Emergência
- Plano de Gestão de Tráfego

De uma forma geral todos os impactos negativos serão mitigados e/ou evitados, desde que todas as medidas de mitigação propostas sejam implementadas, assim como a aplicação de boas práticas tendo em conta a legislação ambiental em vigor e as boas práticas internacionais incluindo as Directrizes Ambientais e Sociais da JICA (2010). O relatório do EAS, foi será submetido às autoridades governamentais responsáveis pela actividade do Projecto e ambiental em Angola (Ministério da Energia e Águas e o da Cultura, Turismo e Ambiente), para efeitos de aprovação e consequente licenciamento ambiental.



Empresa Nacional de Distribuição de Electricidade - E.P.

Cónego Manuel Das Neves 234, Luanda
Telefone: (+244) 222 641 760; 923 366 345

dnjoao@gmail.com

migueljvictoria28083@gmail.com

www.ende.co.ao/



Holísticos, Lda. – Estudos, Serviços & Consultoria

Rua 60, Casa 559, Urbanização Harmonia,
Lar do Patriota, Luanda
Telefones: (+244) 927 442 844; 915 034 779

holisticos@holisticos.co.ao

www.holisticos.co.ao



o Electric Power Services Co., Ltd.

ESTUDO AMBIENTAL SIMPLIFICADO DO PROJECTO DA LINHA DE DISTRIBUIÇÃO DE ELECTRICIDADE DE 60 KV ENTRE A SUBESTAÇÃO DO LUBANGO LESTE E A SUBESTAÇÃO DA ARIMBA

Documento Informativo



JUNHO 2022

Histórico

A região centro-Sul do território nacional apresenta carências relativamente ao acesso à energia eléctrica da rede pública, principalmente nas áreas distantes dos perímetros urbanos (bairros que surgiram sem planificação urbana) e zonas rurais.

Neste contexto, de forma a dar resposta às necessidades de energia eléctrica do município do Lubango, a Empresa Nacional de Distribuição de Electricidade - E.P. (ENDE), em parceria com a empresa japonesa Tokyo Electric Power Services Co., Ltd. (TEPCO) e com o financiamento da Japan International Cooperation Agency (JICA), pretende construir uma Linha de Distribuição (DT) de 60 kV de aproximadamente 10 km entre a Subestação do Lubango Leste e a Subestação da Arimba no Lubango (ver **Figura 1**). Na construção da Subestação da Arimba será implementada uma Linha de Distribuição subterrânea de 60 kV de aproximadamente 500 metros entre a Subestação Arimba e a Central Arimba 2.



Figura 1: Traçado (amarelo) da linha de transmissão de 60 kV entre a Subestação do Lubango Leste e a Subestação da Arimba.

Descrição do Projecto

A colocação das estruturas da linha de distribuição será montada e erguida no solo definido para cada torre. A área total de terreno limpo para acomodar cada torre (área para posicionamento permanente da torre) é de 8 x 8 m. No total, serão erguidas aproximadamente 36 torres separadas em 300 metros cada uma.

As actividades necessárias e de apoio à execução do Projecto incluirão a instalação do estaleiro de apoio à obra, sinalização e abertura de acessos, desminagem de possíveis engenhos explosivos não detonados, remoção de vegetação, abertura e criação da faixa de protecção, trabalhos de topografia, trabalhos de construção dos maciços de fundação, montagem das bases, colocação de dispositivos de sinalização de advertências diversas, entre outros.

Na fase de operação será constituída uma faixa de reserva de ao longo da linha, onde o uso da terra será condicionado. Será mantida uma faixa de protecção, na qual não poderão existir construções (escolas e hospitais) ou árvores de porte elevado, requerendo periodicamente actividades de corte ou poda e a manutenção das vias de acesso às torres. A fase de construção irá durar cerca de entre 15 meses e, no seu pico, poderá empregar de forma directa aproximadamente 80 trabalhadores. Espera-se que o Projecto tenha uma vida útil de pelo menos 40 anos.

Estudo Ambiental Simplificado

Tendo em consideração os potenciais impactes positivos e negativos que envolvem os Projectos de construção e operação de linhas de transmissão e distribuição de energia eléctrica, está a ser desenvolvido um Estudo Ambiental Simplificado (EAS), para apoiar o Licenciamento Ambiental de todas as actividades relacionadas ao Projecto.

De acordo com o anexo do Decreto Presidencial n.º 117/20 de 22 de Abril sobre o Regulamento Geral de Avaliação de Impacte Ambiental e do Procedimento de Licenciamento Ambiental o presente Projecto é de **Categoria C**, logo a instalação do mesmo previamente requer uma Licença Ambiental nos termos da legislação nacional aplicável.

Deste modo, foi elaborado um Estudo Ambiental Simplificado (EAS) tendo em conta a legislação ambiental em vigor e as boas práticas internacionais incluindo as Directrizes Ambientais e Sociais da JICA (Abril 2010). O objectivo do EAS é a identificação e análise de como as actividades do Projecto resultarão em potenciais impactes sobre as componentes ambientais (ar, água, solo, vegetação, fauna, habitats sensíveis, patrimónios culturais, etc.) e a qualidade de vida das pessoas e comunidades próximas a área do Projecto. O EAS também visa propor medidas exequíveis para evitar, minimizar ou compensar o ambiente e as comunidades dos impactes identificados.

A caracterização ambiental e social da área de influência do Projecto foi feita através de análise documental, levantamentos de campo e estudos de base especializados para as seguintes componentes: Clima, Geologia e Geomorfologia, Solos, Hidrologia, vegetação e Fauna, Uso da Terra, Aspectos Socioeconómicos, Património Histórico e Cultural e Áreas Sensíveis. Nos levantamentos efectuados não foram identificadas áreas ambientais sensíveis na área de influência do projecto nem qualquer necessidade de reassentamento humano.

Auscultação às Partes Interessadas

Com o objectivo de divulgar amplamente o Projecto a ENDE, em parceria com a Holísticos e com o apoio das equipas da JICA e da TEPSCO serão realizados encontros adicionais de auscultação pública às partes interessadas. Estes encontros terão também a participação da Administração Municipal do Lubango, da Administração Comunal da Arimba e das autoridades tradicionais onde serão abordados detalhes do Projecto e os potenciais impactes ambientais, sociais e culturais (positivos e negativos) e serão apresentadas as principais medidas de mitigação e o respectivo Plano de Gestão Ambiental e Social. Também serão apresentados os resultados do Plano Abreviado de Reassentamento.

A etapa de auscultação pública é de extrema importância para o processo de EAS, uma vez que o processo possibilita o exercício conjunto e participativo de identificação de preocupações e expectativas face ao Projecto, avaliação justa e completa dos potenciais impactes do Projecto, bem como a definição de medidas de mitigação adequadas.



Tokyo Electric Power Services Co., Ltd.

Auscultação Pública (Fase 2)

Projecto da Linha de Distribuição de Electricidade de 60 kV entre a subestação do Lubango Leste e a subestação da Arimba



Junho de 2022

1



AGENDA DO ENCONTRO

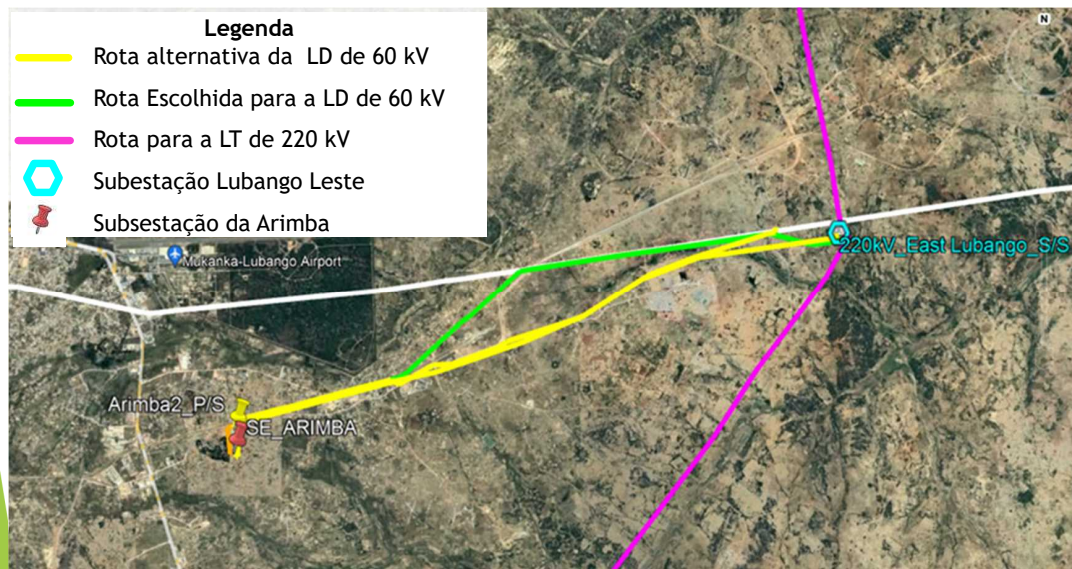


INTRODUÇÃO

- ▶ De forma a dar resposta a demanda de electricidade na Província da Huíla, a ENDE, realizou u estudo de viabilidade com o apoio da empresa japonesa TEPSCO e com o financiamento da JICA, pretende instalar uma Linha de Distribuição de 60 kV de aproximadamente 10 km, entre a Subestação do Lubango Leste e a Subestação da Arimba, ambas a serem construídas.
- ▶ Na construção da Subestação da Arimba será implementado uma Linha de Distribuição subterrânea de 60 kV de 500 m entre a Subestação Arimba e a Central Arimba 2 que será enterrada ao longo da estrada a oeste do local da subestação.

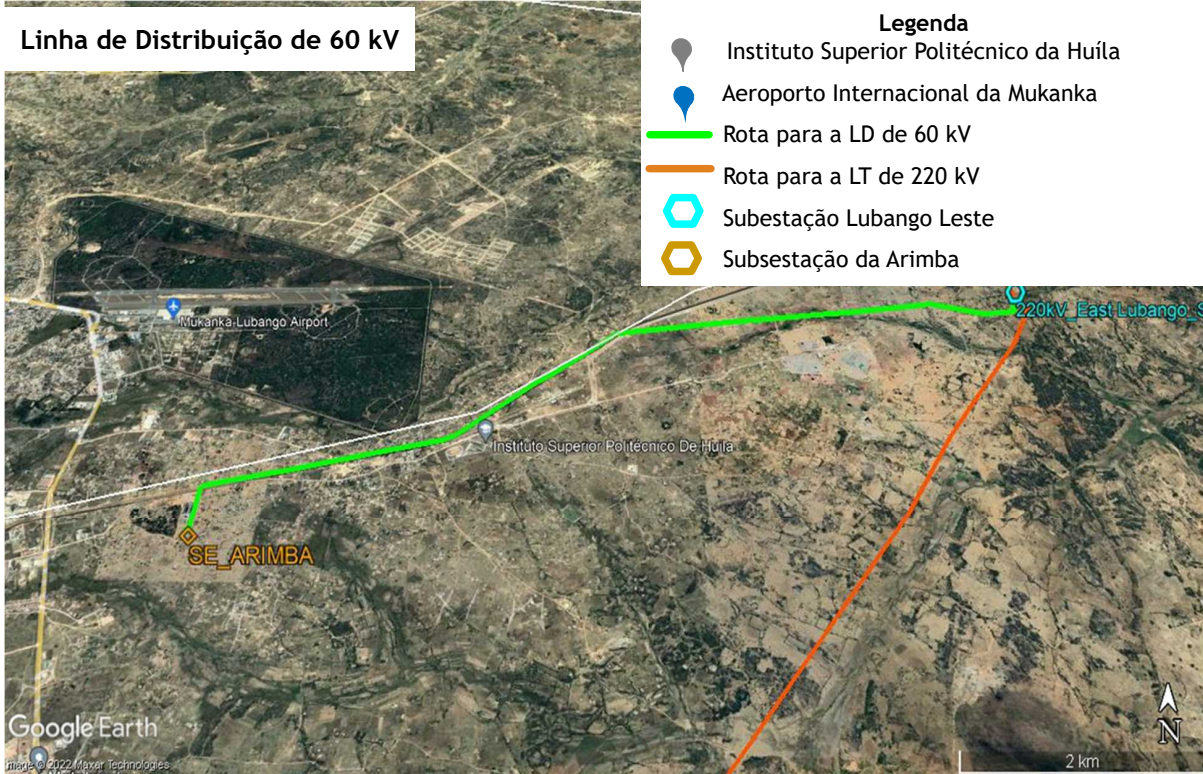
ALTERNATIVAS DE LOCALIZAÇÃO

- ▶ As alternativas do projecto foram exploradas para assegurar que o desenvolvimento será sustentável no contexto das necessidades socioeconómicas (emprego, saúde, etc.) e físicas (topografia, paisagem, etc.) da área e arredores do Projecto, dada a presença de elementos importantes de locais como os edifícios escolares (Instituto Superior Politécnico da Huíla), e zonas residenciais rurais.



A alternativa **verde** foi a escolhida porque atravessa menos estruturas físicas, infra-estruturas e áreas para cultivo ou criação de gado, e evita qualquer reassentamento físico.

LOCALIZAÇÃO DO PROJECTO (1)

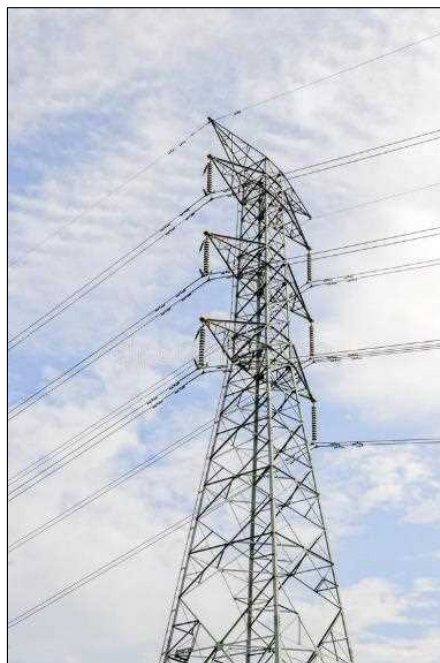


LOCALIZAÇÃO DO PROJECTO (2)



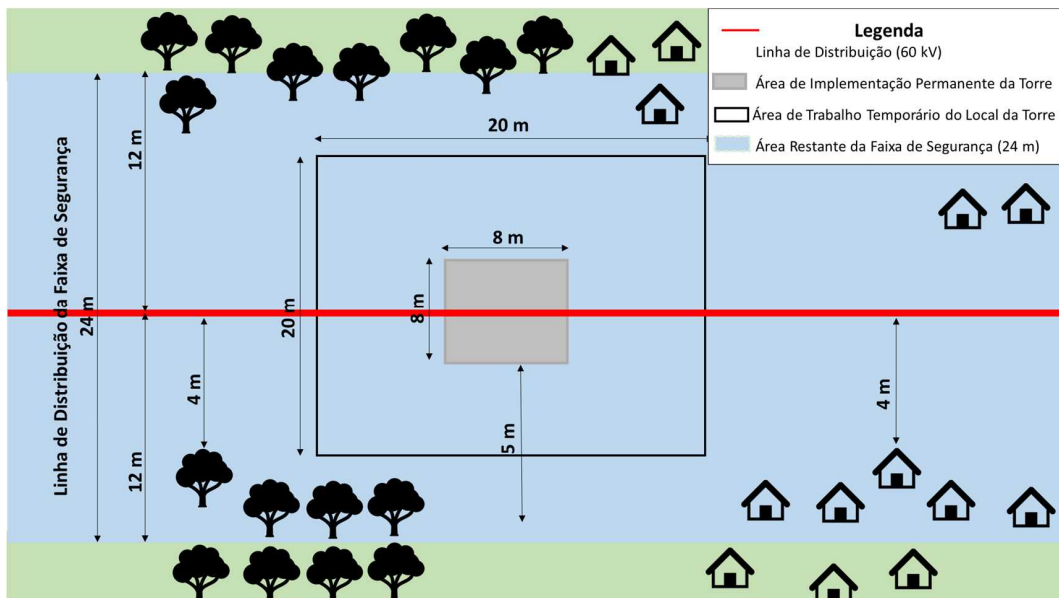
PROMOTOR DO PROJECTO

- ▶ O Projecto é promovido pela ENDE.
- ▶ O Projecto irá aderir os Padrões de Desempenho para Questões Ambientais e Sociais da JICA (*JICA Guidelines for Environmental and Social Considerations*) de Abril de 2010.
- ▶ A empresa Japonesa TEPCO realizou a concepção preliminar deste Projecto para apoiar a ENDE ao abrigo do contrato com a JICA.
- ▶ A ENDE manterá um discurso aberto com a sociedade e consultará todas as partes interessadas de forma a identificar e implementar soluções julgadas adequadas para as mesmas.



DESCRIÇÃO DO PROJECTO (1)

- ▶ Durante a fase de construção da linha de distribuição será necessário o estabelecimento de uma área tampão, que é definida como corredor de 24 metros centrado no alinhamento da linha (12 m para cada lado da linha).
- ▶ A área total de terreno limpo para acomodar a torre (área para posicionamento permanente da torre) é de 8 x 8 m. No total, serão erguidas aproximadamente 36 torres em cerca de 300 metros de distância entre cada uma.



DESCRIÇÃO DO PROJECTO (2)

- ▶ Durante a fase de construção (18 meses) do Projecto, as actividades necessárias e de apoio à execução do Projecto incluirão:
 - ▶ Instalação do estaleiro de apoio à obra;
 - ▶ Sinalização e abertura de acessos;
 - ▶ Remoção de vegetação, abertura ou criação da faixa de protecção;
 - ▶ Trabalhos de topografia;
 - ▶ Trabalhos de construção dos maciços de fundação;
 - ▶ Montagem das bases;
 - ▶ Desminagem dentro do corredor de 24 metros.
 - ▶ Colocação de dispositivos de balizagem aérea e a
 - ▶ Sinalização de advertências diversas, entre outros.



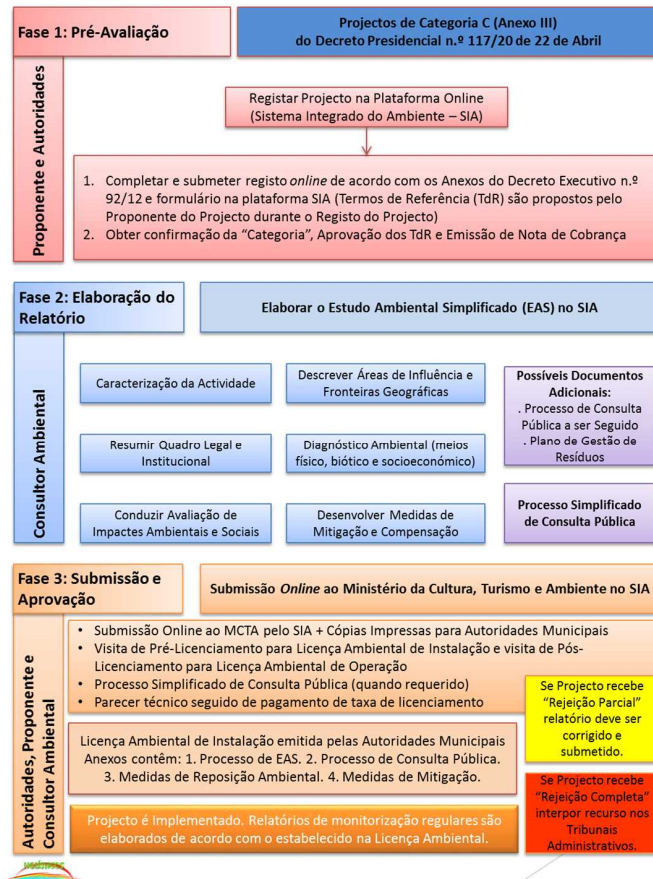
9

DESCRIÇÃO DO PROJECTO (3)

- ▶ Na fase de operação (40 anos) será constituída uma faixa de reserva de ao longo da linha, onde o uso da terra será condicionado.
- ▶ Será mantida uma faixa de protecção, na qual não poderão existir:
 - ▶ Construções (escolas e hospitais); ou
 - ▶ Árvores de porte elevado.
- ▶ Periodicamente serão realizadas actividades de corte ou poda e a manutenção das vias de acesso às torres.



PROCESSO DE AIA EM ANGOLA



ENQUADRAMENTO LEGAL

► O relatório do Estudo Ambiental Simplificado (EAS), será elaborado de acordo a legislação vigente na República de Angola, nomeadamente:



DIRECTRIZES DA JICA

- ▶ A JICA criou um conjunto de directrizes de forma a garantir a sustentabilidade dos vários Projectos que financia (Directrizes Ambientais e Sociais da JICA, Abril 2010).
- ▶ Possui um conjunto de orientações de operação, que têm de ser implementadas:
 - ▶ Divulgação das Informações do Projecto.
 - ▶ Consulta aos Informantes Chaves Locais.
 - ▶ Avaliação Ambiental e Social (Após a Categorização dos Projectos).
 - ▶ Auscultação Pública às Partes Interessadas e Potencialmente Afectada.
 - ▶ Preocupação sobre o Ambiente Social e Direitos Humanos.
 - ▶ Biodiversidade e Ecossistemas.
 - ▶ Aceitação Social.
 - ▶ Reassentamento Involuntário e Compensação.
 - ▶ Comunidades Etnolinguísticas.



CARACTERIZAÇÃO DA SITUAÇÃO DE REFERÊNCIA

- ▶ Foram efectuadas visitas nos meses de Agosto, Setembro e Novembro de 2021
- ▶ Levantamento da biodiversidade: habitats, flora, fauna e identificação de serviços de ecossistema.
- ▶ Registo de imagens fotográficas ao longo do traçado do projecto.
- ▶ Registo de coordenadas geográficas de pontos sensíveis no traçado do projecto.
- ▶ Medições da qualidade do ar e o ambiente sonoro ao longo do traçado.
- ▶ Disseminação de informação do projecto e auscultação pública (autoridades a nível municipal e comunidades no traçado da linha).
- ▶ Levantamento de informação socioeconómica junto da Administração Municipal do Lubango e Comunal da Arimba.
- ▶ Identificação do uso do solo e modo de vida das populações.
- ▶ Mapeamento das comunidades etnolinguísticas.
- ▶ Identificação do patrimónios cultural.
- ▶ Consulta de bibliografia relevante:
 - ▶ Relatórios de estudos ambientais desenvolvidos nos últimos 10 anos
 - ▶ Relatório do Censo 2014



ASPECTOS AMBIENTAIS (1)



Medição de ruído e material particulado efectuadas na área do Projecto.



ASPECTOS AMBIENTAIS (2)

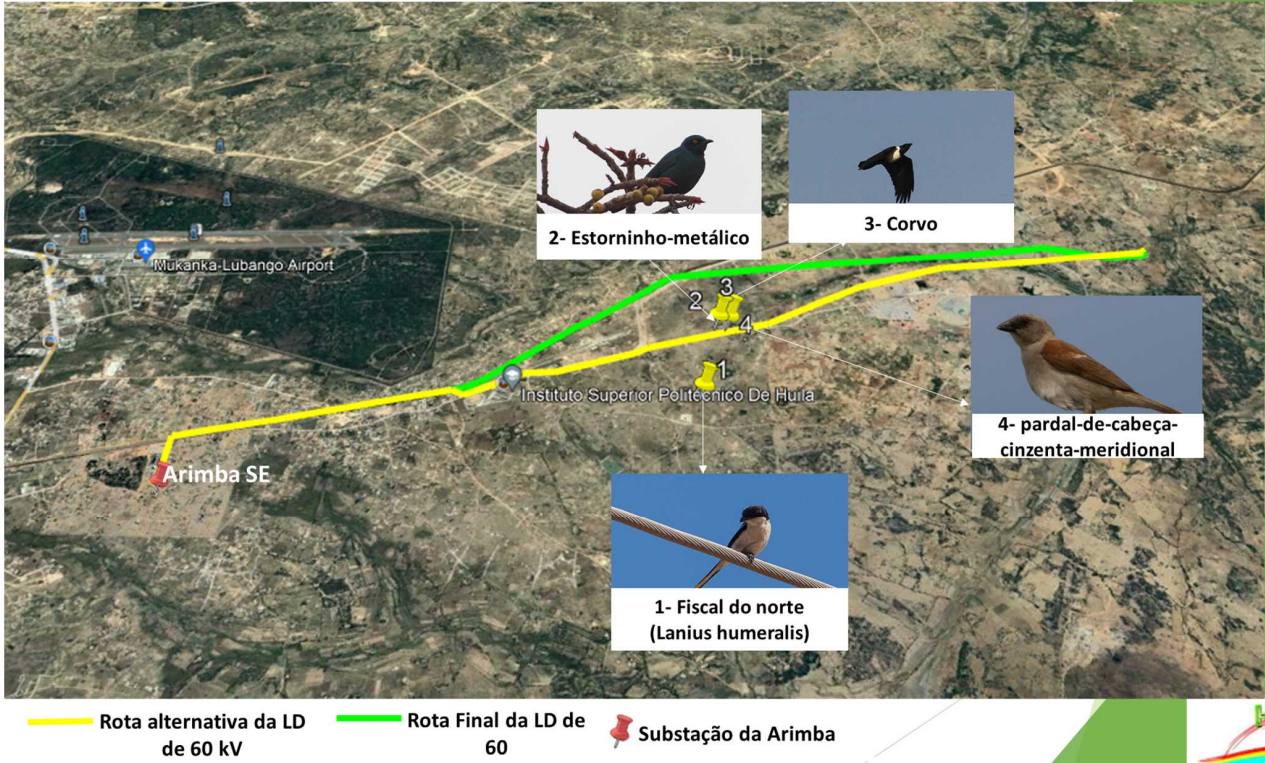


Ambiente na área de influência da linha de distribuição e da subestação da Arimba



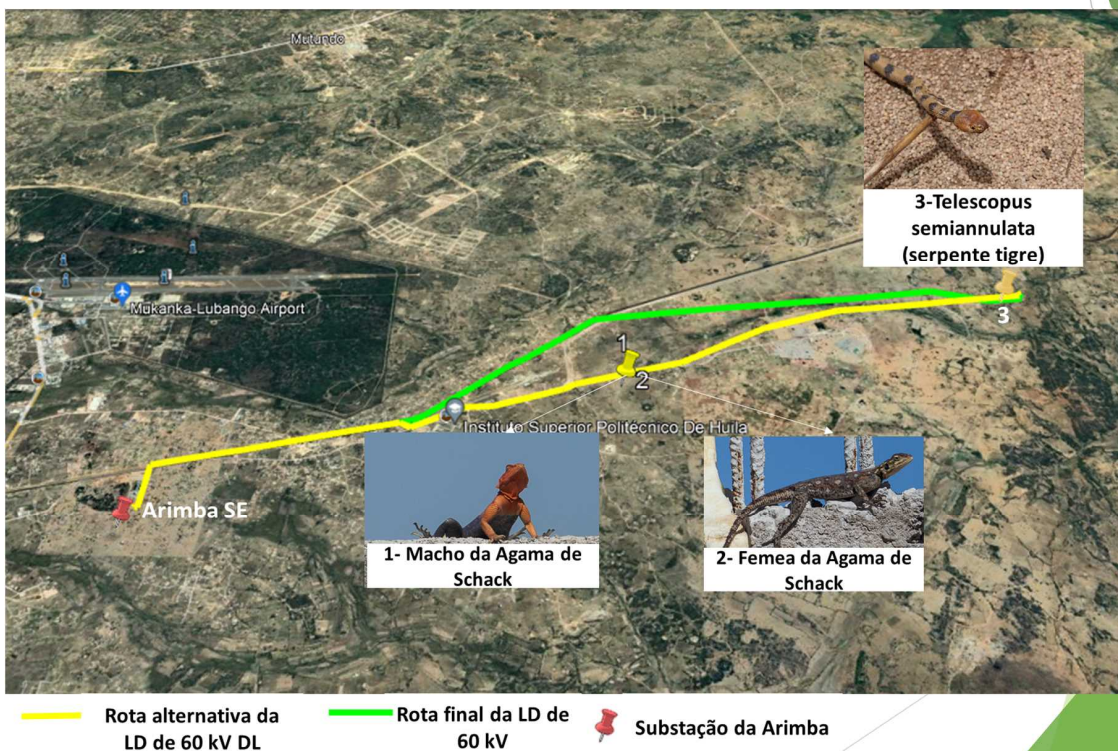
ASPECTOS AMBIENTAIS (3)

Fauna

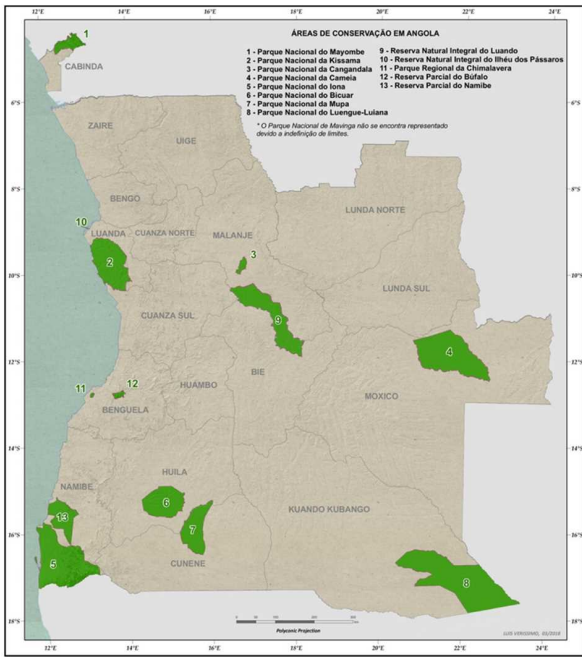


ASPECTOS AMBIENTAIS (4)

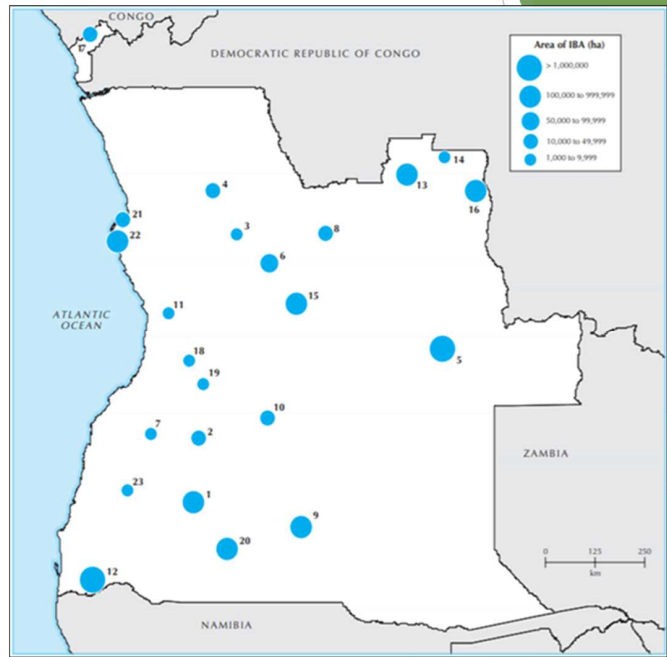
Fauna



ASPECTOS AMBIENTAIS (5)



Áreas de Conservação em Angola



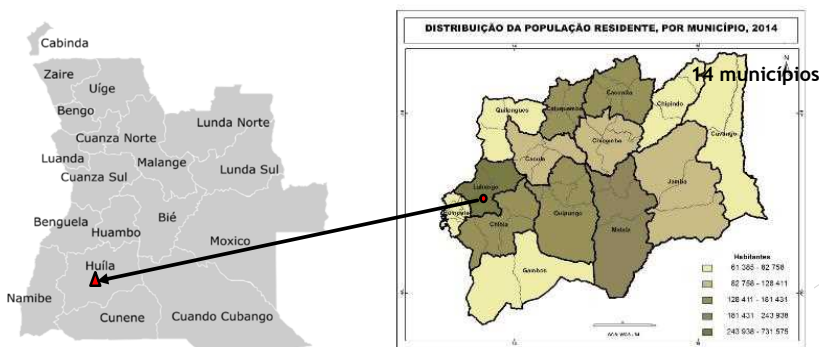
Áreas Importantes para as Aves e a Biodiversidade em Angola



ASPECTOS SOCIAIS (1)

População

- ▶ A população total na província da Huíla de 2 819 253 habitantes. A Huíla corresponde, assim, à segunda província angolana com maior número de habitantes.
- ▶ Na cidade do Lubango existe várias infra-estruturas essenciais e serviços diversos, tais como: escolas, universidades, hospitais provinciais e municipais, energia eléctrica da rede pública e infra-estruturas de lazer, etc.
- ▶ As principais actividades económicas ao longo do traçado do projecto são a agropecuária, indústrias extractivas e transformadoras



ASPECTOS SOCIAIS (2)



Área de influência da subestação e linha de distribuição da Arimba



ENCONTROS DE AUSCULTAÇÃO

Resumo

- ▶ Realizado em Novembro de 2021 com os moradores da comuna da Arimba, representante da ENDE e a equipa da Holísticos no Jango Comunitário da Administração Comunal da Arimba.
- ▶ Fez-se apresentação do projecto, falou-se sobre a rota proposta para a passagem da linha de distribuição de electricidade, dos trabalhos de levantamentos ambientais e sociais e os potenciais impactes que poderão ocorrer e como serão mitigados. Também foi abordada a importância do Projecto do ponto de vista de desenvolvimento e dinamização da economia na comuna da Arimba e das oportunidades de emprego para os jovens.
- ▶ Os moradores da comuna mostraram grande preocupação com as questões de compensação e reassentamento dos possíveis afectados com a realização do projecto.



AVALIAÇÃO DE IMPACTES AMBIENTAIS E SOCIAIS (1)

▶ Avaliação das componentes:

- ▶ **Físico:** clima, geologia e geomorfologia, solo, qualidade do ar, ambiente sonoro, vibrações e radiação, recursos hídricos e paisagem;
- ▶ **Biótico:** habitats, vegetação e flora; fauna, serviços de ecossistema;
- ▶ **Social e Cultural:** aspectos sociais, aspectos históricos e culturais;
- ▶ **Legal e Económico:** enquadramento económico e legal;

- ▶ **Metodologia:** avaliação qualitativa tanto quanto possível dos potenciais impactes ambientais e sociais resultantes da implementação do Projecto.

23



AVALIAÇÃO DE IMPACTES AMBIENTAIS E SOCIAIS (2)

Impactes previstos identificados

Fase de Construção

Positivos

- Criação de emprego directo
- Dinamização socioeconómica

Negativos

- Redução pontual da qualidade do ar
- Perda e perturbação de habitats
- Perda permanente dos recursos do solo
- Alteração do ambiente sonoro da área

Fase de Operação

Positivos

- Criação de empregos
- Dinamização socioeconómica
- Aumento do fornecimento de electricidade

Negativos

- Alteração da paisagem
- Restrições no uso do solo

24



MEDIDAS DE MITIGAÇÃO PROPOSTAS

- ▶ Sempre que possível, e tendo em conta as necessidades das obras de construção, dar preferência à população local e vizinha no recrutamento de mão-de-obra, para ajudar a reduzir os níveis de desemprego local;
- ▶ Aumentar a consciência ambiental entre os trabalhadores, de modo a reduzir drasticamente a produção de resíduos, e até promover a reutilização dos resíduos na medida do possível;
- ▶ Desenvolver e implementar um Plano de Reamentamento e Compensação para as partes potencialmente afectadas;
- ▶ Realizar campanhas de sensibilização para as comunidades locais sobre os riscos associados à linha de distribuição e subestações e sobre as restrições à utilização da rede de segurança e servidão da linha de distribuição;
- ▶ Prevenir a destruição desnecessária de árvores de habitat, por exemplo, árvores mortas e espécimes velhos. As espécies faunísticas das cavidades e cascas de árvores utilizam estas árvores, nomeadamente várias osgas, cobras, morcegos, genetas, etc.).

25



PLANO DE GESTÃO AMBIENTAL E SOCIAL

Para a implementação deste Projecto foi elaborado um **Plano de Acção Ambiental e Social** que será apoiado por um conjunto de planos onde se destacam os seguintes:

Plano de Gestão de Resíduos

Programa de Saúde, Segurança Ocupacional e Ambiente

Plano de Gestão da Construção

Plano de Preparação e Resposta à Emergências

Plano de Gestão de Tráfego

Plano de Monitorização Ambiental (qualidade do ar ruído)



Objectivo do Estudo do ARAP

- ▶ Para o ARAP foi realizado um censo e aplicação de inquérito aos agregados familiares das comunidades/bairros que eventualmente poderão ser afectadas pelos Projectos, com objectivo:
 - ▶ Avaliar potenciais impactes sociais causados pela implementação dos Projectos;
 - ▶ Identificar e analisar as áreas onde os impactes sociais adversos são previstos e seus graus;
 - ▶ Examinar medidas que satisfaçam os requisitos das Directrizes da JICA para Considerações Ambientais e Sociais emitidas em Abril de 2010; e
 - ▶ Apresentar estimativa de custo para a conclusão e implementação do ARAP.

27



Área em Questão e Resultados do Estudo (1)

LT 220 kV

- ▶ O trabalho de inquérito/censo teve lugar de 15 a 25 de Novembro de 2021.
- ▶ Para o censo foram escolhidas 12 comunidades que se encontram num raio de 100 metros da proposta do traçado do Projecto de Linhas de Transmissão e foram mapeadas as casas que se encontram dentro da faixa de servidão.
- ▶ Foram administrados 225 questionários para cada chefe de um agregado família.



LD 60 kV

- ▶ A recolha de dados ocorreu, junto das comunidades/ aldeias/bairros atravessadas pelo traçado da linha entre os dias 21 e 23 de Dezembro de 2021.
- ▶ A estratégia consistiu em passar por todos os agregados que se encontravam dentro da faixa de servidão num raio de 45 m.
- ▶ No total foram realizados 102 questionários nos bairros, 11 de Novembro, Gazeta, Lola, Muhaha, Mupanda, Poiares, e Sede.



28



Área em Questão e Resultados do Estudo (2)

Município do Lubango

COMUNA	ASSENTAMENTOS AFECTADOS PELA LT 220kV ou LD 60kV	Estudadas	No. DE QUESTIONÁRIOS APLICADOS	
Arimba	Nombungo	✓	22	
	Mateta	✓	24	
	Mavanda	✓	13	
	Poaires Muhaha	✓	52	
	Poaires Kapandi	✓	54	
	Km 14	✓	5	
	Kapalanga	✓	6	
	Figueira	✓	27	
	11 de Novembro	✓	16	
	Gazeta	✓	10	
	Lola	✓	5	
	Mupanda	✓	6	
	Sede	✓	4	
	Arimba Headquarters			
	1	14	13	244

Município da Humpata

COMUNA		Estudadas	No. DE QUESTIONÁRIOS APLICADOS
Palanca	Calumue		
	Kamba		
	Heva de Cima	✓	23
	Palanca	✓	2
Humpata	Jamba I	✓	15
	Camponês	✓	18
	Onculuvala	✓	25
2	7	5	83

Município do Namibe

COMUNA		Estudadas	No. DE QUESTIONÁRIOS APLICADOS
Moçâmedes	Aida		
1	1	0	0

TOTAL

COMUNA		Estudadas	No. DE QUESTIONÁRIOS APLICADOS
4	22	18	327



Condições Socioeconómicas da Área de Estudo

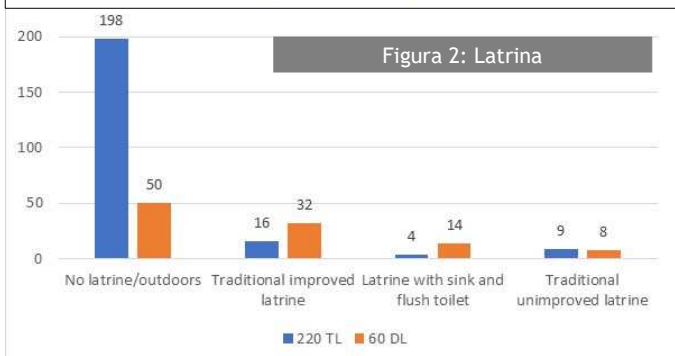
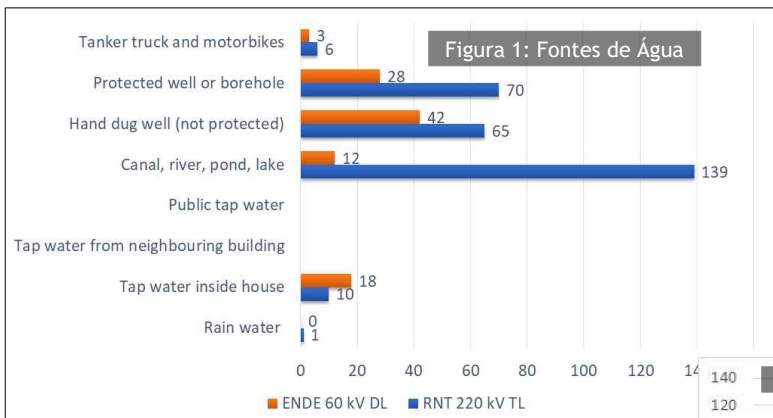
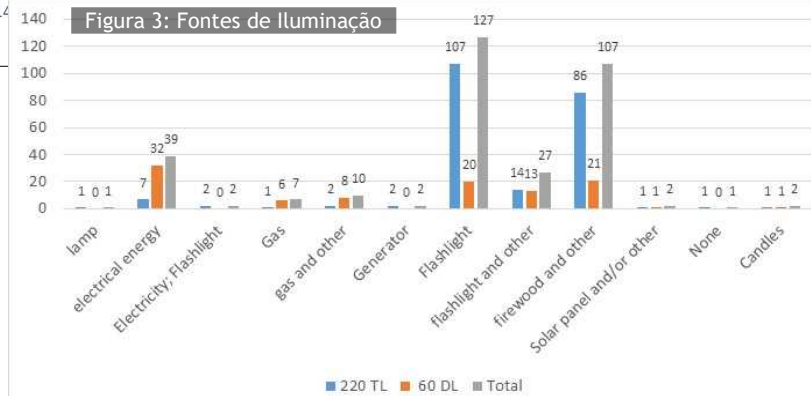


Tabela 1: Doenças (top 5)

220kV TL		Principais Doenças		Número de respostas (questões múltiplas)	
1	Malária	199	88,4%		
2	Cólera	26	11,6%		
3	Febre Tifóide	21	9,3%		
4	Febre Amarela	7	3,1%		
5	Má Nutrição	4	1,8%		

60kV DL		Principais Doenças		Número de respostas (questões múltiplas)	
1	Malária	87	85,3%		
2	Ferimentos Físicos	3	2,9%		
3	Febre Amarela	2	2,0%		
4	Tuberculose	2	2,0%		
5	Doenças Cardíacas	2	2,0%		



Condições Socioeconómicas da Área de Estudo (2)

- ▶ Todas as infraestruturas potencialmente afectadas serão claramente compensadas, nomeadamente:
 - ▶ Casas;
 - ▶ Lavras;
 - ▶ Zonas de pasto;
 - ▶ Fazendas;
 - ▶ Cemitérios.

- ▶ As lavras serão compensadas em função das Tabelas de produtos agrícolas do Ministério da Agricultura e Pescas. Para as demais infraestruturas (Casas) serão contratados especialistas com experiência comprovada no sector imobiliário.

31



Área de Terra a ser Desmatada

220 kV	Fase de construção	Fase de operação	Observações
LINHA (45 m de largura)	45 m	45 m	-
Faixa de Servidão	5 metros de largura	5 metros de largura	-
Área de Construção	25 m X 25 m	N/A	-
Área das Torres	N/A	15 m X 15 m	Localizado dentro da área de construção
Área de Acesso	6 metros de largura	3 metros de largura	Converter em estrada de manutenção
60 kV	Fase de construção	Fase de operação	Observações
Linha (24 m de largura)	24 m	N/A	-
Faixa de Servidão	3 metros de largura	3 metros de largura	-
Área de Construção	20 m X 20 m	N/A	-
Área das Torres	N/A	8 m X 8 m	Localizado dentro da área de construção
Área de Acesso	6 metros de largura	3 metros de largura	Converter em estrada de manutenção

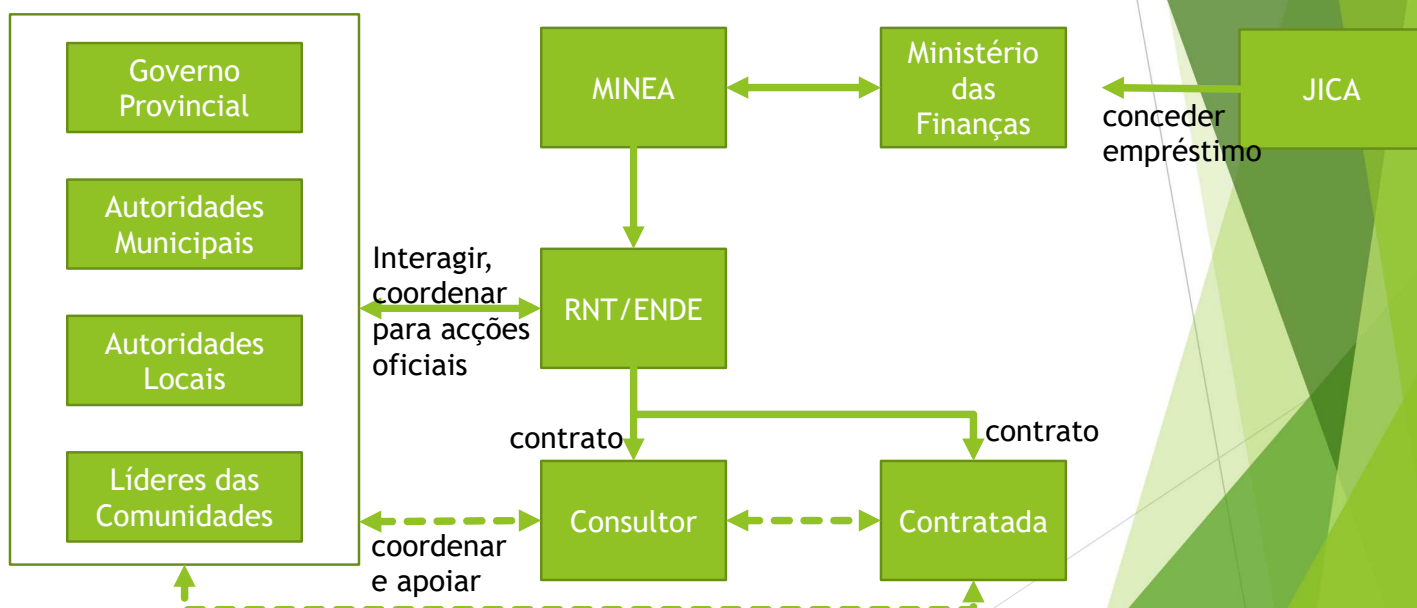
32



Área, Pessoas e Activos Afectados Antecipados

ACTIVO AFECTADO	CATEGORIA SECUNDÁRIA	220 kV TL	60 kV DL
Proprietários das casas	Categoria 1: Proprietário da casa com direitos consuetudinários (Terra Comunitária Rural).	199 casas (955 pessoas)	2 casas (9 pessoas)
	Categoria 2: Proprietário da casa com direitos de propriedade privada.	5 casas (24 pessoas)	1 casa (5 pessoas)
	Categoria 3: Proprietário de casa em Terreno do Estado do Domínio Público sem direitos legalmente reconhecidos.	21 casas (100 pessoas)	0
Proprietários de terras	Categoria 4: Proprietário da Terra com Direito Consuetudinário (Terra Comunitária Rural).	184 ha (40 pessoas)	10 ha (2 pessoas)
	Categoria 5: Proprietário da Terra com Direito de Propriedade Privada	5.7 ha (2 pessoas)	1.2 ha (1 pessoa)
	Categoria 6: Usuário de Terras em Terras Estatais de Domínio Público sem direitos legalmente reconhecidos.	19 pessoas (94 ha)	3 pessoas (13 ha)
Cultivadores (Usuários da terra)	Categoria 7: Cultivador de Culturas/Árvores com ou sem direitos legalmente reconhecidos.	309 ha	8 ha
	Categoria 8: Cultivador de Cultivo/Árvore sob contrato de parceria.	0	0
Proprietários de bens móveis não residenciais	Categoria 9: Proprietários de outros bens móveis (não residenciais).	0	0
Proprietário de Bens Imóveis Não Residenciais	Categoria 10: Proprietário de outras estruturas físicas (não residenciais)	0	0
Empregados de Estruturas Económicas Afectadas	Categoria 11: Proprietários de Estruturas Económicas Afectadas (ou seja, fábricas).	6 proprietários	1 proprietário
	Categoria 12: Funcionários de Estruturas Económicas Afectadas (ou seja, fábricas).	48 funcionários	5 funcionários

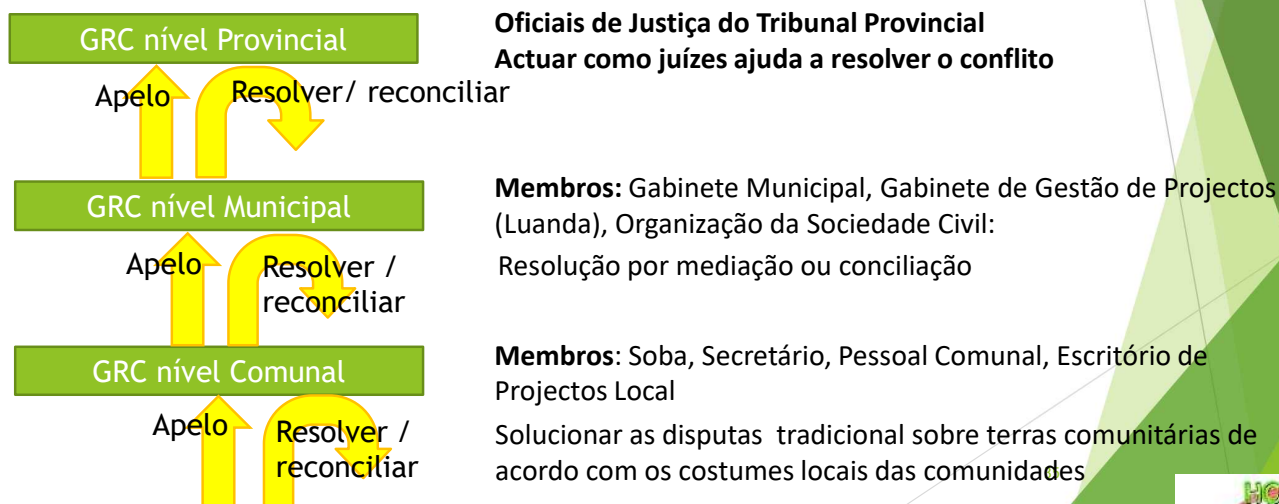
Mecanismo de Implementação



34

Mecanismo de Reparação de Queixas

- ▶ Um mecanismo de reparação de reclamações deve ser estabelecido, que recebe reclamações relevantes para questões de reassentamento e compensação. Este mecanismo de reclamação foi desenvolvido com os seguintes objectivos



Data Limite para as Reclamações

- ▶ O objectivo de estabelecer uma data limite é evitar reclamações especulativas dentro da Área do Projecto por pessoas que buscam compensação.
- ▶ De acordo com a legislação angolana, a data limite de elegibilidade é estabelecida após a declaração da expropriação por utilidade pública. Após esta data, qualquer circunstância iniciada pela pessoa afectada não é levada em consideração e, portanto, não é elegível para compensação.
- ▶ Para se alinhar com os requisitos do PS5 da IFC, as Directrizes da JICA e outras melhores práticas internacionais, o Projecto deve estabelecer a data limite para elegibilidade. Esta data deve ser estabelecida assim que as partes forem informadas de que o Projecto foi aprovado e está em andamento.
- ▶ Todas as comunidades afectadas e agregados familiares afectados serão informados da data limite através de diferentes meios que incluirão a publicação desta informação no jornal angolano (Jornal de Angola), emissão de cartas às autoridades municipais e tradicionais e outros meios acessíveis ao partes interessadas e afectadas.
- ▶ Se houver um intervalo de tempo significativo entre a data limite e a data de implementação real (ou seja, mais de um ano), as famílias podem solicitar um inventário actualizado de activos para considerar quaisquer melhorias feitas na terra. Quaisquer novas culturas ou árvores, que possam ter sido plantadas e não estejam prontas para colheita antes do início da construção também serão consideradas.



PLANO DE REASSENTAMENTO SIMPLIFICADO (1)

- ▶ A execução e implementação do Projecto poderá levar a alguma forma de reassentamento involuntário (físico, económico e/ou cultural) de indivíduos e/ou famílias que possam ser afectados pelo processo de aquisição de terras, uma vez que dentro do Right-of-Way não poderá haver casas, escolas, hospitais, e outros receptores sensíveis, e na área próxima das torres não serão permitidas actividades agrícolas, excepto no que é permitido pela legislação.
- ▶ Para este Projecto foi elaborado um Plano de Reassentamento Simplificado, que visa integrar os requisitos da legislação angolana e aos Padrões de Desempenho (PS) da International Finance Corporation (IFC) (especificamente PS 5 sobre Aquisição e Reinstalação Involuntária de Terras), bem como as Considerações Ambientais e Sociais da JICA (Abril, 2010). Os seus objectivos são:
 - ▶ Atenuação dos efeitos adversos do reassentamento;
 - ▶ Compensação pela perda de bens a custo de substituição;
 - ▶ Assegurar que as actividades de reassentamento sejam implementadas com a devida divulgação de informação, consulta e participação informada das pessoas afectadas;
 - ▶ Melhorar ou, no mínimo, restabelecer os meios de subsistência e os padrões de vida das pessoas deslocadas a níveis pré-projecto, de modo a facilitar melhorias sustentáveis do estatuto sócio-económico e prestando especial atenção às necessidades dos grupos vulneráveis.

37



PLANO DE REASSENTAMENTO SIMPLIFICADO (2)

- ▶ A recolha de dados ocorreu, junto das comunidades/ aldeias/bairros atravessadas pelo traçado da linha entre os dias 21 e 23 de Dezembro de 2021.
- ▶ O trabalho teve início na povoação do Muhaha onde antes da sua operacionalização houve um encontro de concertação com as autoridades administrativas locais (Administrador Adjunto da Comuna da Arimba), autoridades tradicionais locais e os técnicos de campo.
- ▶ A estratégia consistiu em passar por todos os agregados que se encontravam dentro da zona tampão estabelecida (45 m).
- ▶ Os técnicos foram visitando agregado por agregado familiar para responderem ao questionário. Nos casos em que não foi possível encontrar os chefes dos agregados familiares, um dos membros do agregado com idade igual ou superior a 17 anos também puderam responder ao mesmo questionário.



38



PLANO DE REASSENTAMENTO SIMPLIFICADO (3)

- ▶ Foi realizado um censo e aplicação de inquérito aos agregados familiares das comunidades/bairros que eventualmente poderão ser afectadas pelo Projecto, com objectivo de avaliar as condições de vida dos agregados familiares e inventariar os seus bens, servindo de base para o processo de reassentamento e compensação.
- ▶ No total foram realizados 102 inquéritos nos bairros, 11 de Novembro, Gazeta, Lola, Muhaha, Mupanda, Poiares, e Sede.

Resultados

- ▶ Não foram identificadas estruturas físicas a serem demolidas.
- ▶ Cerca de 8 hectares de terra são usados por agricultores de subsistência na área de influência.

Condições de Habitabilidade

- Constituição da residência
- Instalações Sanitárias
- Acesso à Energia

Condições de Subsistência

- Actividade, Meios de Produção e Capacidade Produtiva
- Água
- Bens
- Vulnerabilidade a choques

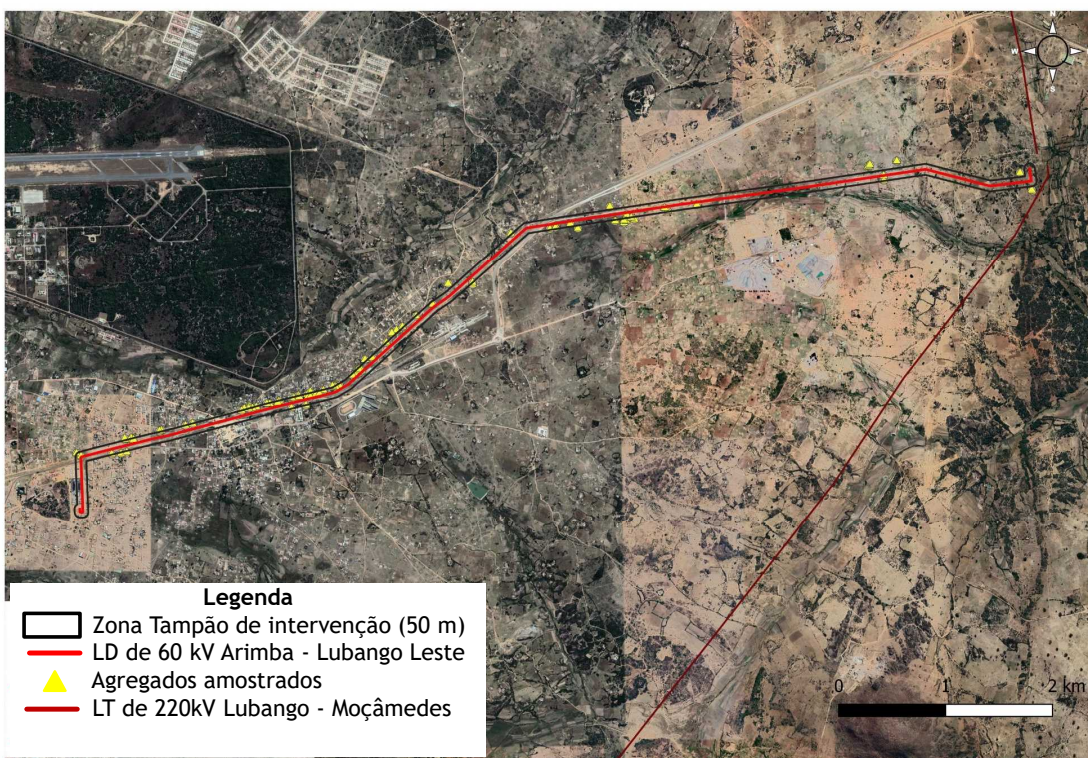
Educação

- Acesso Escolar e Nível Educacional

Acesso à Saúde

- Proximidade a centro ou posto de Saúde

PLANO DE REASSENTAMENTO SIMPLIFICADO (4)



CONSIDERAÇÕES FINAIS

- ▶ Este projecto tem um potencial económico e social estratégico para o desenvolvimento da província da Huíla, melhorando o fornecimento de electricidade a vários consumidores, a iluminação urbana e promovendo o turismo e a industrialização.
- ▶ Os potenciais impactes positivos e negativos previstos reflectem-se em pequenas alterações até alterações significativas; mas não há grandes alterações negativas que possam causar impactos negativos significativos no ambiente e na componente social.
- ▶ Uma vez que considerações ambientais e sociais são tomadas para evitar/minimizar os impactos, e as medidas de mitigação propostas são implementadas e as boas práticas são aplicadas, tendo em conta a legislação ambiental actual e as melhores práticas internacionais, incluindo as Directrizes Ambientais e Sociais da JICA (Abril de 2010), espera-se que os impactos negativos sejam mitigados.
- ▶ Será devidamente implementado um programa de monitorização ambiental para preparar as incertezas e será estabelecido um mecanismo de reparação de queixas.
- ▶ Não foram identificados quaisquer impedimentos de ordem ambiental e social para a não execução do **Projecto da Linha de Distribuição de Electricidade de 60 kV e a subestação do Lubango Leste e a subestação da Arimba, e a construção da subestação da Arimba.**



ESTADO ACTUAL DO PROJECTO

- ▶ Relatório de EAS:
 - ▶ Às autoridades financiadoras e a ENDE têm validado o Projecto;
 - ▶ Está a ser submetido à um processo de auscultação às partes interessadas e afectadas (último evento ocorreu em Novembro de 2021);
 - ▶ Será submetido às autoridades governamentais responsáveis pela actividade do Projecto e ambiental em Angola (Ministério da Energia e Águas e o da Cultura, Turismo e Ambiente respectivamente), para efeitos de licenciamento ambiental.



SUGESTÕES E RECOMENDAÇÕES



Empresa Nacional de Distribuição de Electricidade - E.P.

Cónego Manuel das Neves 234, Luanda
Telefone: (+244) 222 641 760; 923 366 345
dnjoao@gmail.com
migueljvictoria28083@gmail.com
www.ende.co.ao/



Holísticos, Lda. – Serviços, Estudos & Consultoria Rua 60, Casa 559, Urbanização Harmonia, Lar do Patriota, Luanda

Telefones: 927 442 844; 915 034 779
holisticos@holisticos.co.ao
www.holisticos.co.ao
www.facebook.com/holisticos.angola



APPENDIX 8

Proof of Registration at SIA/MCTA



República de Angola

MINISTÉRIO DO AMBIENTE

GABINETE DA MINISTRA

Nº do Protocolo: **10269201227** - Licença Ambiental de Instalação

1. Projeto

Empreendedor: 5410778170 - Ende - Ep - Emp. Nac. de Dist. de Electricidade

Nome do Empreendimento: Projecto da Linha de Distribuição de Electricidade de 60 kV entre a Subestação do Lubango Leste e a Subestação da Arimba na Província da Huíla

Moeda do Investimento: Dólar Americano

Valor do Projeto: 1.100.000,00

Categoria: A

Classificação: Indústria de energia

Atividade: Linhas de transporte de energia eléctrica, acima de 230KV

Local de Atendimento: MINISTÉRIO DA CULTURA, TURISMO E AMBIENTE

2. Endereço

no Bairro Poiães Arimba, Distrito Arimba, Município de Lubango, Huíla

3. Responsável

Nome: 5410778170 - Ende - Ep - Emp. Nac. de Dist. de Electricidade

E-mail: vidalgoncalves@yahoo.com.br

Telefone Comercial: +244 222641760

Projecto registado no dia 20/01/2022 e submetido ao MINISTÉRIO DA CULTURA, TURISMO E AMBIENTE para o devido tratamento.

A autenticidade deste documento poderá ser verificada através dos passos a seguir:

1. Aceda ao Portal MINAMB (<https://sia.minamb.gov.ao/validacaodocumentos>).
2. Introduza o código **PROT-MTANjkyMDEyMjcNA==** no campo "Código de Validação".
3. Clique em "Pesquisar".

DNPAIA - Rua dos Enganos - Edifício Zimbo Tower, 4º andar, Ingombota – Luanda.

Email: dnpaia@mcta.gov.ao



Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

APPENDIX 9

Monitoring Form

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

9-1. Monitoring Form for 60kV distribution lines

<Pre-construction Phase>

1. Air pollution

- Monitoring item: PM10, PM2.5
- Record: measurements are taken once every three months before and after felling and clearing, at the two tower locations and at the boundaries of neighboring dwellings and other structures

(Date)

(Location)

(data) item (Unit)	baseline value	measured value (Average value)	measured value (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
PM10 ($\mu\text{g}/\text{m}^3$)				-	0.150 (Interim target-1) 0.100 (Interim target-2) 0.075 (Interim target-3) 0.050 (guideline)	Measured by PM meter for 30 minutes
PM2.5 ($\mu\text{g}/\text{m}^3$)				-	0.075 (Interim target-1) 0.050 (Interim target-2) 0.0375 (Interim target-3) 0.025 (guideline)	Measured by PM meter for 30 minutes

2. Water pollution

(1) Wastewater treatment records

- Monitoring item: wastewater treatment status
- Record: record once a week at the construction site and at the workers' quarters
- Check the operator's (CND) record ledger

Date	point	monitoring item	Status during the reporting period
		Wastewater treatment status	

(2) Water quality items

- Monitoring item: items in the table below
- Record: once every three months before and after felling and clearing, measurements are taken if there is running water at two stream points in the vicinity of the tower location

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measured value (Max. value)	local standard (Surface water)	local standard (Drinking water)	Remarks (e.g. location, frequency and method of measurement)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

pH (measure of acidity)				5.0-9.0	6.5-8.5 5.5-9.0	Portable pH meter
water temperature (°C)				30	22 25	water thermometer
conductivity (µS/cm at 20°C)				-	1000	conductometer
transparency (cm)				-	-	Transparency meter

3. Soil pollution

- Monitoring item: fuel, lubricating oil and other leaks
- Record: record once a week at the construction site and at the workers' quarters
- Check the operator's (CND) record ledger

date	point	monitoring item	Status during the reporting period
		Fuel, lubricating oil and other leaks	

4. Noise and vibration

(1) Noise level

- Monitoring item: noise levels
- Record: measurements are taken once every three months before and after felling and clearing, at the two tower locations and at the boundaries of neighboring dwellings and other structures

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(2) Complaints

- Monitoring items: complaints from municipalities, communes and settlements
- Record: record as needed

Date	point	Complaint details	support	Remarks (resolution status)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

5. Offensive Odors

(1) Odors

- Monitoring item: presence or absence of odors by sensory examination
- Record: once a week at the workers' quarters
- Check the operator's (CND) record ledger

Date	point	monitoring item	Status during the reporting period
		odors (sensory)	

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements
- Record: record as needed
- Check the operator's (CND) record ledger

date	point	Complaint details	action	Remarks (resolution status)

6. Waste

- Monitoring item: waste storage and transport conditions
- Record: once a week, at the workers' quarters and construction site, the amount of waste collected and disposed of by item by the waste collection and disposal contractor
- Check the operator's (CND) record ledger

date	point	monitoring item	Status during the reporting period
		Amount collected by contractors	

7. Ecosystems

(1) Flora and fauna

- Monitoring item: flora and fauna

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Record: observations are made once every 6 months before and after clearing and rooting, at two points at the location of the towers in the clearing and rooting area

date	point	monitoring item	Status during the reporting period
		plant species	
		animal species	

(2) Birds

- Monitoring item: birds
- Record: observations are carried out once every 6 months before and after felling and clearing, at two points at the location of the towers in the felling and clearing area

date	point	monitoring item	Status during the reporting period
		bird species present	

8. Land acquisition and resettlement

- Monitoring item: impacts on land residential structures, and places of livelihood due to land acquisition; provision of alternative land and structures; compensation process.
- Record: avoid social impacts by plotting private land/uses and residential and other structures on a map during the geological & topological survey and detailed design. If unavoidable, record the status of resettlement and demolition/removal of existing structures due to acquisition, using the following format; see also ARAP Monitoring Form (Annex 10-1)

date	record	outline	Notes (e.g. maps)
	Private land / used land		
	Residential structure		
	Place of livelihood		

(Note) Monitoring points are tower locations and ROW.

date	point	Objects to be acquired and actions (e.g. status of demolition and removal of existing structures)	Notes (e.g. maps)

(Note) Monitoring points are where land is to be acquired out of tower locations and ROW.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

9. Existing social infrastructure and social services

- Monitoring item: impact of mine exploration and clearance operations on social services.
- Record: record as needed, the location of social service facilities (hospitals, churches, schools, community facilities, etc.) should be plotted on a map to confirm the extent of demining work, while avoiding impacts where possible. If unavoidable, record the nature of the impact (e.g. closure or not, time period affected, number of people affected, etc.) using the following format.

date	point	Impact details	Notes (e.g. maps)

(Note) Monitoring points are tower locations, ROW and surrounding settlements and facilities.

10. Working environment (including occupational safety)

- Monitoring item: Casualties among operators due to mines and UXO explosions.
- Record: record the situation, etc., of accidents, as needed, at tower locations and ROW using the following format as a reference.

date	point of accident	Circumstances and details of the accident	Notes (e.g. maps)

11. Accidents

- Monitoring item: Accidents occurred due to mine and UXO explosions
- Record: record the circumstances, etc., of any accidents, as needed, at tower locations, ROW and workshop using the following format as a reference.

Date	point of accident	Circumstances and details of the accident	Notes (e.g. maps)

<Construction Phase>

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

1. Air pollution

- Monitoring item: PM10, PM2.5
- Record: measurements are taken once every three months before and after the construction of the towers, at two tower locations and at the boundaries of neighboring dwellings and other structures

(Date)

(Location)

(data) item (Unit)	baseline value	measured value (Average value)	measured value (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
PM10. ($\mu\text{g}/\text{m}^3$)				-	0.150 (Interim target-1) 0.100 (Interim target-2) 0.075 (Interim target-3) 0.050 (guideline)	Measured by PM meter for 30 minutes
PM2.5 ($\mu\text{g}/\text{m}^3$)				-	0.075 (Interim target-1) 0.050 (Interim target-2) 0.0375 (Interim target-3) 0.025 (guideline)	Measured by PM meter for 30 minutes

2. Water pollution

(1) Wastewater treatment records

- Monitoring item: wastewater treatment status
- Record: record at construction sites and workers' quarters as required
- Check contractor's record ledgers

date	point	monitoring item	Status during the reporting period
		Wastewater treatment status	

(2) Water quality items

- Monitoring item: items in the table below
- Record: measurements are taken once every three months before and after the construction of the tower, when there is running water in the stream near the tower construction site

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measured value (Max. value)	local standard (Surface water)	local standard (Drinking water)	Remarks (e.g. location, frequency and method of measurement)
pH (measure of acidity)				5.0-9.0	6.5-8.5 5.5-9.0	Portable pH meter
water				30	22	water

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

temperature (°C)					25	thermometer
conductivity (μS/cm at 20°C)				-	1000	conductometer
transparency (cm)				-	-	Transparency meter

3. Soil pollution

- Monitoring item: fuel, lubricating oil and other leaks
- Record: record at construction sites and workers' quarters as required
- Check contractor's record ledgers

date	point	monitoring item	Status during the reporting period
		Fuel, lubricating oil and other leaks	

4. Noise and vibration

(1) Noise level

- Monitoring item: noise level
- Record: measurements are taken once every three months before and after the construction of the towers, at two tower locations and at the boundaries of neighboring dwellings and other structures

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements about noise and vibration
- Record: record as needed

date	point	Complaint details	support	Remarks (resolution status)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

5. Offensive Odors

(1) Odors

- Monitoring item: presence or absence of odors by sensory examination
- Record: once a week at the workers' quarters
- Check contractor's record ledgers

date	point	monitoring item	Status during the reporting period
		odors (sensory)	

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements
- Record: record as needed
- Check contractor's record ledgers

Date	point	Complaint details	support	Remarks (resolution status)

6. Waste

- Monitoring item: waste storage and transport conditions
- Record: once a week, at the workers' quarters and construction site, the amount of waste collected and disposed of by item by the waste collection and disposal contractor
- Check contractor's record ledgers

date	point	monitoring item	Status during the reporting period
		Amount collected by contractors	

7. Ecosystems

(1) Flora and fauna

- Monitoring item: flora and fauna
- Record: observations are made once every 6 months before and after the construction of the towers, at two points at the location of the towers

date	point	monitoring item	Status during the reporting
------	-------	-----------------	-----------------------------

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

		period
	plant species	
	animal species	

(2) Birds

- Monitoring item: birds
- Record: observations are made once every six months before and after the construction of the towers, at two points at the location of the towers

date	point	monitoring item	Status during the reporting period
		bird species present	

8. Land acquisition and resettlement

- Monitoring item: resident relations (e.g. grievance redress), site management (e.g. entry restrictions and boundary management), etc.
- Record: record once every three months using the following format; record as needed for resident relations. See also ARAP Monitoring Form (Annex 10-1)

date	point	Livelihood level and means of the affected population	Remarks

(Note) Monitoring points are where the affected population lives and places of livelihood means.

date	point	Complaint details	action	Remarks (resolution status)

(Note) Monitoring points are where the affected population lives and places of livelihood means.

date	point	Site management status	Remarks

(Note) Monitoring points are tower locations and ROW.

9. Land use and utilization of local resource

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Monitoring item: resident relations (e.g. complaint handling), site management (e.g. entry restrictions and boundary management)
- Record: record as needed for resident response using the following format for recording; once every three months for site management. See also ARAP Monitoring Form (Annex 10-1)

date	point	Complaint details	action	Remarks (resolution status)

(Note) Monitoring points are where the affected population lives and places of livelihood means.

date	point	Site management status	Remarks

(Note) Monitoring points are tower locations and ROW.

10. Existing social infrastructure and social services

- Monitoring item: construction plans (e.g. time, number and frequency of vehicle operations), vehicle operation records, number of traffic accidents, etc.
- Record: record as needed. Query contractor vehicle operation records and accident records

date	point	Review period and details	Remarks
	Construction work plan	e.g. time, number and frequency of vehicle operations	
	Vehicle operation record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	

11. Misdistribution of benefits and damages

- Monitoring item: livelihood level and means of the affected population, resident relations (e.g. grievance redress), etc.
- Record: record once every three months, at concerned villages, using the following format as a reference for recording; record as needed for resident relations.

date	point	Livelihood level and means of the affected population	Remarks

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point	Complaint details	action	Remarks (resolution status)

12. Local conflicts of interest

- Monitoring item: livelihood level and means of the affected population, resident relations (e.g. grievance redress), etc.
- Record: record once every three months, at concerned villages, using the following format as a reference for recording; record as needed for resident relations.

date	point	Livelihood level and means of the affected population	Remarks

date	point	Complaint details	action	Remarks (resolution status)

13. Landscape

- Monitoring item: trees, harmony between hardscape and natural landscapes
- Record: record every three months, visual fixed-point observations and photography are conducted and documented at ROW/ tower locations and at labor camp/materials yard installations

date	point	monitoring item	Status during the reporting period

14. Gender

- Monitoring item: resident relations (e.g. handling of complaints), number and content of instructions to contractors and subcontractors' employees, their participants, etc.
- Record: record resident response, as needed at concerned villages, using the following format as a guide.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point	Complaint details	action	Remarks (resolution status)

Instruction records of contractor and subcontractor employees shall be queried once every three months.

date	record	review period and details	remarks
	Records of instructions and guidance	Number, content and participants, etc.	

15. Children's rights

- Monitoring item: resident relations (e.g. handling of complaints), employment in construction works, etc.
- Record: record resident relations, as needed at concerned villages with reference to the following format. Employment records by contractors are queried every three months as to whether they are employed on construction work.

date	point	Complaint details	action	Remarks (resolution status)

date	record	Review period and details	Remarks
	Employment registration ledger		

16. Infectious diseases such as HIV/AIDS

- Monitoring item: number of diseases and infections, standing medical supplies, number and type of vaccinations, number and content of instructions to contractor and subcontractor employees and number of participants.
- Record: refer to contractor health records, equipment ledgers, immunization records and instruction / guidance records every three months.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date of occurrence	record	number of occurrences	Remarks
	Health management record	Number of occurrences, etc.	
	Equipment ledger	Number of equipment, etc.	
	Immunization record	Number of immunization, etc.	
	Records of instructions and guidance	Number, content and participants, etc.	

17. Working environment (including occupational safety)

- Monitoring item: Casualties among workers due to mines and UXO explosions; demining work; time, content and number of participants in safety training for contractor and subcontractor employees; availability of PPE; work contents; health status of workers; number of accidents; working hours, etc.
- Record: Record as needed, for accidents due to mine and UXO explosions and demining works, using the following format; Refer to contractor instruction / guidance record, equipment ledgers, work record, health check-up record, accidents and working hours once every three months by the contractor.

<Record of casualties among workers due to mine and UXO explosions>

Date	point of accident	Details of accident	Notes (e.g. maps)

(Note) Monitoring points are in the construction site.

<Records of demining work>

Date	date of discovery	detection point	Types of mines and unexploded ordnance, etc.	date(s) (e.g. for processing, finishing, etc.)	Month and date of resumption of construction

(Note) Monitoring points are in the construction site.

<Work safety and health>

date	record	review period and details	remarks
	Records of instructions and guidance	Number, content and participants, etc.	
	Equipment ledger	Number of PPE, etc.	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

	Work record		
	Health check-up record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	
	Working hour record		

18. Accidents

- Monitoring item: occurrence of accidents due to mines and UXO explosions, demining work, work contents, vehicle operation records, number of accidents, etc.
- Record: Record as needed accidents due to mine and UXO explosions and demining work using the following format as a reference. The status of vehicle operations and accidents occurring as a result of construction work shall be monitored, as needed, and the contractor's records shall be queried.

<Record of casualties among workers due to mine and UXO explosions>

Date	point of accident	Details of accident	Notes (e.g. maps)

(Note) Monitoring points are in the construction site.

<Records of demining work>

Date	date of discovery	detection point	Types of mines and unexploded ordnance, etc.	date(s) (e.g. for processing, finishing, etc.)	Month and date of resumption of construction

(Note) Monitoring points are in the construction site.

<Accident record>

date	record	review period and details	remarks
	Vehicle operation record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	

<Operation Phase>

1. Noise and vibration

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

(1) Noise level

- Monitoring item: noise levels
- Record: measurements are taken once every three months at two representative points under the line and on the administrative road, at locations where wind noise is likely to occur and in neighboring settlements

(Date)

(Location)

Item (unit)	measured value (Average value)	measured value (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
noise level			-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements
- Record: record as needed

Date	point	Complaint details	support	Remarks (resolution status)

2. Ecosystems

(1) Flora and fauna

- Monitoring item: flora and fauna
- Record: once every three months, observations are made at two representative towers

Date	point	monitoring item	Status during the reporting period
		plant species	
		animal species	

(2) Birds

- Monitoring item: birds
- Record: observations are made at two representative towers every three months

Date	point	monitoring item	Status during the reporting period



Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

		bird species present	
--	--	----------------------	--

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

9-2. Monitoring Form for Arimba substation

<Pre-construction Phase>

1. Air pollution

- Monitoring item: SO₂, NO₂, O₃, PM10, PM2.5
- Record: once every 6 months before and after logging and root removal, for one week in a row; SO₂, NO₂, O₃ at the construction site of the Arimba substation; once every 3 months; PM10 and PM2.5 measurements at the boundaries of the substation and neighboring dwellings and on access roads

(Date)

(Location)

(data) item (Unit.)	baseline value	measured value (Average value)	measured value (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
SO ₂					0.125 (Interim target-1) 0.050 (Interim target-2) 0.020 (guideline)	24-hour average
NO ₂					0.04	annual average
O ₃					0.160 (Interim target-1) 0.100 (guideline)	8-hour average
PM10. (µg/m ³)				-	0.150 (Interim target-1) 0.100 (Interim target-2) 0.075 (Interim target-3) 0.050 (guideline)	Measured by PM meter for 30 minutes
PM2.5 (µg/m ³)				-	0.075 (Interim target-1) 0.050 (Interim target-2) 0.0375 (Interim target-3) 0.025 (guideline)	Measured by PM meter for 30 minutes

2. Water pollution

- Monitoring item: wastewater treatment status
- Record: once a week at the Arimba substation construction site and at the workers' quarters
- Check the operator's (CNN) record ledger

date	point	monitoring item	Status during the reporting period
		Wastewater treatment status	

3. Soil pollution

- Monitoring item: fuel, lubricating oil and other leaks
- Record: once a week at the construction site of the Arimba substation and at the workers' quarters

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Check the operator's (CND) record ledger

date	point	monitoring item	Status during the reporting period
		Fuel, lubricating oil and other leaks	

4. Noise and vibration

(1) Noise level

- Monitoring item: noise levels
- Record: measurements are taken once every three months before and after felling and clearing, at the boundary of the Arimba substation construction site and neighboring dwellings, and at the access road

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements about noise and vibration
- Record: record as needed

date	point	Complaint details	support	Remarks (resolution status)

5. Offensive Odors

(1) Odors

- Monitoring item: presence or absence of odors by sensory examination
- Record: once a week at the Arimba substation construction site and at the workers' quarters
- Check the operator's (CND) record ledger

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point	monitoring item	Status during the reporting period
		odors (sensory)	

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements
- Record: record as needed
- Check the operator's (CND) record ledger

Date	point	Complaint details	support	Remarks (resolution status)

6. Waste

- Monitoring item: waste storage and transport conditions
- Record: once a week, at the workers' quarters and at the construction site of the Arimba substation, the amount of waste collected and disposed of by item by the waste collection and disposal contractor
- Check the operator's (CND) record ledger

Date	point	monitoring item	Status during the reporting period
		Amount collected by contractors	

7. Ecosystems

(1) Flora and fauna

- Monitoring item: flora and fauna
- Record: observations are made at the Arimba substation construction site once every 6 months before and after felling and clearing

Date	point	monitoring item	Status during the reporting period
		plant species	
		animal species	

(2) Birds

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

- Monitoring item: birds
- Record: observations are made at the Arimba substation construction site once every 6 months before and after felling and clearing

Date	point	monitoring item	Status during the reporting period
		bird species present	

8. Topography and geology

- Monitoring item: topographical and vegetation changes and soil erosion
- Record: fixed-point observation and photography of the terrain at the Arimba substation before and after each felling and rooting should be carried out and recorded

date	point	monitoring item	Status during the reporting period

9. Existing social infrastructures and services

- Monitoring item: impact of mine exploration and clearance operations on social services
- Record: record as needed, the location of social service facilities (hospitals, churches, schools, community facilities, etc.) should be plotted on a map to confirm the extent of demining work, while avoiding impacts where possible. If unavoidable, record the nature of the impact (e.g. closure or not, time period affected, number of people affected, etc.) using the following format

date	point	Impact details	Notes (e.g. maps)

(Note) Monitoring points are Arimba substation, surrounding settlements and facilities.

10. Working environment (including occupational safety)

- Monitoring item: Casualties among operators due to mines and UXO explosions.
- Record: record the situation, etc., of accidents, as needed, at Arimba substation, using the following format as a reference

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point of accident	Circumstances and details of the accident	Notes (e.g. maps)

11. Accidents

- Monitoring item: Accidents occurred due to mine and UXO exploration and clearance activities
- Record: record the circumstances, etc., of any accidents, as needed, at Arimba substation and workshop using the following format as a reference.

date	point of accident	Circumstances and details of the accident	Notes (e.g. maps)

<Construction Phase>

1. Air pollution

- Monitoring item: SO₂, NO₂, O₃, PM10, PM2.5
- Record: measurements of SO₂, NO₂ and O₃ at the construction site of the Arimba substation once every 6 months before and after the construction of the tower; measurements of PM10 and PM2.5 once every 3 months at the boundaries of the substation and neighboring dwellings and on access roads.

(Date)

(Location)

(data) item (Unit.)	baseline value	measured value (Average value)	measured value (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
SO ₂					0.125 (Interim target-1) 0.050 (Interim target-2) 0.020 (guideline)	24-hour average
NO ₂					0.04	annual average
O ₃					0.160 (Interim target-1) 0.100 (guideline)	8-hour average
PM10. (µg/m ³)				-	0.150 (Interim target-1) 0.100 (Interim target-2) 0.075 (Interim target-3) 0.050 (guideline)	Measured by PM meter for 30 minutes
PM2.5 (µg/m ³)				-	0.075 (Interim target-1) 0.050 (Interim target-2) 0.0375 (Interim target-3) 0.025 (guideline)	Measured by PM meter for 30 minutes

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

2. Water pollution

- Monitoring item: wastewater treatment status
- Record: record at construction sites and workers' quarters as required
- Check contractor's record ledgers

Date	point	monitoring item	Status during the reporting period
		Wastewater treatment status	

3. Soil pollution

- Monitoring item: fuel, lubricating oil and other leaks
- Record: record at construction sites and workers' quarters as required
- Check contractor's record ledgers

Date	point	monitoring item	Status during the reporting period
		Fuel, lubricating oil and other leaks	

4. Noise and vibration

(1) Noise level

- Monitoring item: noise levels
- Record: measurements are taken once every three months at the boundaries of dwellings and other structures in close proximity to the Arimba substation, and at access roads

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)
noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements about noise and vibration
- Record: record as needed

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point	Complaint details	support	Remarks (resolution status)

5. Offensive Odors

(1) Odors

- Monitoring item: presence or absence of odors by sensory examination
- Record: record once a week at the construction site and at the workers' quarters
- Check contractor's record ledgers

date	point	monitoring item	Status during the reporting period
		odors (sensory)	

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements
- Record: record as needed
- Check contractor's record ledgers

Date	point	Complaint details	action	Remarks (resolution status)

6. Waste

- Monitoring item: waste storage and transport conditions
- Record: once a week, at the workers' quarters and construction site, the amount of waste collected and disposed of by item by the waste collection and disposal contractor
- Check contractor's record ledgers

Date	point	monitoring item	Status during the reporting period
		Amount collected by contractors	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

7. Ecosystems

(1) Flora and fauna

- Monitoring item: flora and fauna
- Record: observations are made every three months at the Arimba substation construction site

date	point	monitoring item	Status during the reporting period
		plant species	
		animal species	

(2) Birds

- Monitoring item: birds
- Record: observations are made every three months at the Arimba substation construction site

Date	point	monitoring item	Status during the reporting period
		bird species present	

8. Topography and geology

- Monitoring item: topographic and vegetation changes and soil erosion
- Record: observations and photography are carried out and recorded at the Arimba substation once every six months

date	point	monitoring item	Status during the reporting period

9. Existing social infrastructure and social services

- Monitoring item: construction plans (e.g. time, number and frequency of vehicle operations), vehicle operation records, number of traffic accidents, etc.
- Record: record as needed. Query contractor vehicle operation records and accident records

date	point	Review period and details	Remarks
	Construction work plan	e.g. time, number and frequency of vehicle operations	
	Vehicle operation record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

10. Landscape

- Monitoring item: trees, harmony between hardscape and natural landscapes
- Record: once every three months, visual fixed-point observations and photography are conducted and documented at the Arimba substation and at the workers' camp/materials yard installation

Date	point	monitoring item	Status during the reporting period

11. Gender

- Monitoring item: resident relations (e.g. handling of complaints), number and content of instructions to contractors and subcontractors' employees, their participants, etc.
- Record: record resident relations, as needed at concerned villages, using the following format as a reference

date	point	Complaint details	action	Remarks (resolution status)

Instruction records of contractor and subcontractor employees shall be queried once every three months.

date	record	review period and details	remarks
	Records of instructions and guidance	Number, content and participants, etc.	

12. Children's rights

- Monitoring item: resident relations (e.g. handling of complaints), employment in construction works, etc.
- Record: record resident relations, as needed at concerned villages, with reference to the following format. Employment records by contractors are queried every three months as to whether they are employed on construction work.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

date	point	Complaint details	action	Remarks (resolution status)

date	record	Review period and details	Remarks
	Employment registration ledger		

13. Infectious diseases such as HIV/AIDS

- Monitoring item: number of diseases and infections, standing medical supplies, number and type of vaccinations, number and content of instructions to contractor and subcontractor employees and number of participants
- Record: once every three months. Query contractor health records, equipment ledgers, immunization records and instruction / guidance records

date of occurrence	record	number of occurrences	Remarks
	Health management record	Number of occurrences, etc.	
	Equipment ledger	Number of equipment, etc.	
	Immunization record	Number of immunization, etc.	
	Records of instructions and guidance	Number, content and participants, etc.	

14. Working environment (including occupational safety)

- Monitoring item: Casualties among workers due to mines and UXO explosions; demining work; time, content and number of participants in safety training for contractor and subcontractor employees; availability of PPE; work contents; health status of workers; number of accidents; working hours, etc.
- Record: Record as needed, for accidents due to mine and UXO explosions and demining works, using the following format. Refer to contractor instruction / guidance record, equipment ledgers, work, health check-up record, accidents and working once every three months by the contractor

<Record of casualties among workers due to mine and UXO explosions>

Date	point of accident	Details of accident	Notes (e.g. maps)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

(Note) Monitoring points are in the construction site.

<Records of demining work>

Date	date of discovery	detection point	Types of mines and unexploded ordnance, etc.	date(s) (e.g. for processing, finishing, etc.)	Month and date of resumption of construction

(Note) Monitoring points are in the construction site.

<Work safety and health>

date	record	review period and details	remarks
	Records of instructions and guidance	Number, content and participants, etc.	
	Equipment ledger	Number of PPE, etc.	
	Work record		
	Health check-up record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	
	Working hour record		

15. Accidents

- Monitoring item: occurrence of accidents due to mines and UXO explosions, demining work, work contents, vehicle operation records, number of accidents, etc.
- Record: Record as needed accidents due to mine and UXO explosions and demining work using the following format as a reference. The status of vehicle operations and accidents occurring as a result of construction work shall be monitored, as needed, and the contractor's records shall be queried

<Record of casualties among workers due to mine and UXO explosions>

Date	point of accident	Details of accident	Notes (e.g. maps)

(Note) Monitoring points are in the construction site.

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

<Records of demining work>

Date	date of discovery	detection point	Types of mines and unexploded ordnance, etc.	date(s) (e.g. for processing, finishing, etc.)	Month and date of resumption of construction

(Note) Monitoring points are in the construction site.

<Accident record>

date	record	review period and details	remarks
	Vehicle operation record		
	Accident record	Location, number of accidents and work when accident occurred, etc.	

<Operation Phase>

1. Water pollution

- Monitoring item: Status of disposal of wastewater, garbage, fuel, oil, etc., and education implementation
- Record: once every three months at the Arimba substation

date	point	monitoring item	Status during the reporting period
		Status of disposal of wastewater, garbage, fuel, oil, etc. Status of education implementation	

2. Noise and vibration

(1) Noise level

- Monitoring item: noise levels
- Record: measurements are taken once every three months at the boundaries of dwellings and other structures in close proximity to the Arimba substation, and at access roads

(Date)

(Location)

Item (unit)	baseline value	measured value (Average value)	measurement (Max. value)	local standard	Referred to international standards	Remarks (e.g. location, frequency and method of measurement)

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

noise level (dB A)				-	Daytime: 55 dBA Nighttime: 45 dBA Industrial zone: 70 dBA	Measured with sound level meter for 30 minutes
--------------------	--	--	--	---	---	--

(2) Complaints

- Monitoring item: complaints from municipalities, communes and settlements about noise and vibration
- Record: record as needed

date	point	Complaint details	support	Remarks (resolution status)

3. Offensive Odors

(1) Odors

- Monitoring item: presence or absence of odors by sensory examination
- Record: record as needed at the Arimba substation

date	point	monitoring item	Status during the reporting period
		odors (sensory)	

(2) Complaints

- Monitoring item: complaints about odors at the Arimba substation
- Record: record as needed

Date	point	Complaint details	support	Remarks (resolution status)

4. Waste

- Monitoring item: waste storage and transport conditions
- Record: record as needed at the Arimba substation

date	point	monitoring item	Status during the reporting

Simplified Environmental Study Report for the 60 kV Distribution Line Project between the 220/60 kV East Lubango Substation and the 60/15 kV Arimba Substation in Lubango, Huíla Province

			period
		Amount collected by contractors	


5. Topography and geology


- Monitoring item: topographic and vegetation changes and soil erosion
- Record: fixed-point observation and photography of the terrain at the Arimba substation every six months and record the results


date	point	monitoring item	Status during the reporting period




Holísticos – Serviços, Estudos e Consultoria, Lda.
 Urbanização Harmonia, Rua 60, Casa 559, Lar do Patriota
 Luanda | República de Angola

 + 244 222 017 962

 + 244 927 442 844
 + 244 912 034 779

 2426, Apartado IV

 holisticos@holisticos.co.ao

 www.holisticos.co.ao

 www.facebook.com/holisticos.angola

Soluções Ambientais para um Futuro Sustentável